Reconnaissance of Chemical and Physical Characteristics of Selected Bottom Sediments of the Caloosahatchee River and Estuary, Tributaries, and Contiguous Bays, Lee County, Florida, July 20-30, 1998

U.S. GEOLOGICAL SURVEY
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By Mario Fernandez, Jr., Marci Marot, *and* Charles Holmes

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Tallahassee, Florida
1999

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CONVERSION FACTORS AND ADDITIONAL ABBREVIATIONS

Multiply	By	To obtain
inch (in.)	25.40	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer

μg/kg = micrograms per kilogram
< = less than
> = greater than
BDL = below detection limit
CaPAHs = carcinogenic polycyclic aromatic hydrocarbons
CBBI = Charlotte Harbor–Bird Island
CBFM = Charlotte Harbor–Ft. Myers
cm = centimeter
dpm/g = disintegrations per minute per gram
EPA = Environmental Protection Agency
FDEP = Florida Department of Environmental Protection
kev = kiloelectron volts
mg/kg = milligrams per kilogram
MWP = Mussel Watch Program
NOAA = National Oceanic and Atmospheric Administration
NS&T = National Status and Trends
PAHs = polycyclic aromatic hydrocarbons
PCBs = polychlorinated biphenyls
PEL = Probable Effects Level
ppb = parts per billion
ppm = parts per million
QC = quality control
SFWMD = South Florida Water Management District
TEL = Threshold Effects Level
TOC = total organic carbon
USGS = United States Geological Survey

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Abstract

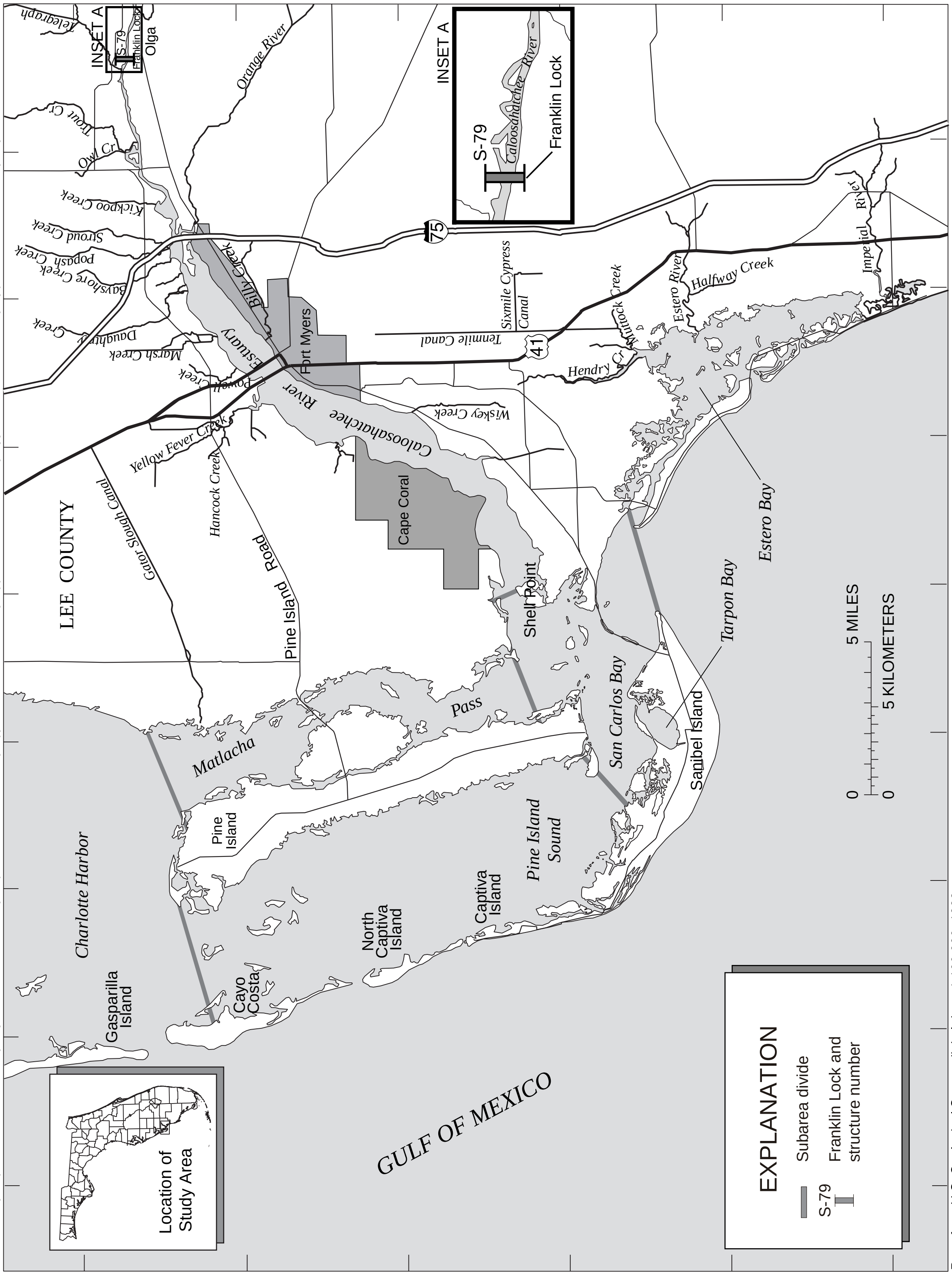
This report summarizes a reconnaissance study, conducted July 20-30, 1998, of chemical and physical characteristics of recently deposited bottom sediments in the Caloosahatchee River and Estuary. Recently deposited sediments were identified using an isotopic chronometer, Beryllium-7 (^{7}Be), a short-lived radioisotope. Fifty-nine sites were sampled in an area that encompasses the Caloosahatchee River (River) about three miles upstream from the Franklin Lock (S-79), the entire tidally affected length of the river (estuary), and the contiguous water bodies of Matlacha Pass, San Carlos Bay, Estero Bay, Tarpon Bay, and Pine Island Sound in Lee County, Florida.

Bottom sediments were sampled for ^{7}Be at 59 sites. From the results of the ^{7}Be analysis, 30 sites were selected for physical and chemical analysis. Sediments were analyzed for particle size, total organic carbon (TOC), trace elements, and toxic organic compounds, using semiquantitative methods for trace elements and organic compounds. The semiquantitative scans of trace elements indicated that cadmium, copper, lead, and zinc concentrations, when normalized to aluminum, were above the natural background range at 24 of 30 sites. Particle size and TOC were used to characterize sediment deposition patterns and organic content. Pesticides, polychlorinated biphenyls (PCBs), and carcinogenic polycyclic aromatic hydrocarbons (CaPAHs) were determined at 30 sites using immunoassay analysis. The semiquantitative immunoassay analyses of toxic organic compounds indicated that all of the samples contained DDT, cyclodienes as chlordane (pesticides), and CaPAHs. PCBs were not detected.

Based on analyses of the 30 sites, sediments at 10 of these sites were analyzed for selected trace elements and toxic organic compounds, including pesticides, PCBs, and PAHs, using quantitative laboratory procedures. No arsenic or cadmium was detected. Zinc was detected at two sites with concentrations greater than the lower limit of the range of sediment contaminant concentrations that are usually or always associated with adverse effects (Florida Department of Environmental Protection's Sediment Quality Assessment Guidelines). Organochlorine pesticides were detected at four sites at concentrations below the reporting limits; there were no organophosphorus pesticides or PCBs detected. PAHs were detected at eight sites; however, only four sites had concentrations above the reporting limit.

INTRODUCTION

The South Florida Water Management District (District) is developing a Caloosahatchee River Water Management Plan to address environmental conditions and water-supply needs of the Caloosahatchee watershed. As part of this plan, the District will evaluate nitrogen, phosphorus, and potential toxic trace elements in the sediments in the Caloosahatchee River and Estuary, and the contiguous water bodies of Matlacha Pass, San Carlos Bay, Estero Bay, Tarpon Bay, and Pine Island Sound, (fig. 1), in Lee County, Florida (study area). As part of this plan, the USGS in July 1998, in cooperation with the District, conducted a reconnaissance of chemical and physical characteristics of selected bottom-sediment samples in the study area for anthropogenic organic compounds and trace elements. The anthropogenic compounds are referenced in this study as toxic organic compounds and include organochlorine pesticides, organophosphorus pesticides, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs) which include the carcinogenic PAHs (CaPAHs). The anthropogenic trace elements include arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc.



Base from U.S. Geological Survey digital data, 1:100,000, 1983
Albers Equal-Area Conic projection
Standard Parallels 29° 30′ and 45° 30′, central meridian –83° 00′

Figure 1. Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998.

Purpose and Scope

The purpose of this report is to summarize the findings of the USGS reconnaissance survey of bottom sediments in the Caloosahatchee River and Estuary, tributaries, and contiguous bays conducted on July 20-30, 1998.

The USGS reconnaissance survey consisted of the following activities:

- Determination of the chemical and physical characteristics of 60 selected bottom sediment-sampling sites including 2 sites above the Franklin Lock (S-79), and
- Selection of 10 sampling sites for analysis of toxic organic compounds and selected trace elements. The 10 sites were selected from the 60 bottom sediment-sampling sites.

A technical advisory group, consisting of USGS and South Florida Water Management District personnel, selected the initial 60 sampling sites. Fifty-eight sites were located in the estuary, tributaries, and the bays; and two sites were located upstream of the Franklin Lock.

Previous Studies

Several Federal and State agencies have previously conducted sediment chemistry investigations of the Caloosahatchee River and Estuary. The National Oceanic and Atmospheric Administration (NOAA) has monitored spatial and temporal trends of chemical contamination and biological responses to contamination in their National Status and Trends Program (NS&T). NOAA's Mussel Watch Program (MWP) has monitored bottom sediments at Charlotte Harbor-Bird Island (CBBI) (at the mouth of the Caloosahatchee River) in 1986 and 1987, and Charlotte Harbor-Ft. Myers (CBFM) in 1988 (table 1, plate 1). The constituents analyzed in the sediments included chlorinated pesticides, PCBs, PAHs, total organic carbon (TOC), and selected trace elements. Sediment-size distribution was also determined.

The Florida Department of Environmental Protection (FDEP) published the "Florida Coastal Sediment Contaminants Atlas" in 1994 which presented the quality of the coastal sediments for five sites in the Caloosahatchee Estuary, one site in San Carlos Bay, and one site in Estero Bay (table 1). The atlas presents summarized data and interpretations for the distribution of pesticides, PCBs, PAHs, TOC, total nitrogen, total phosphorus, and trace elements**.**

The FDEP further developed a statistical/graphical approach to differentiate concentrations of trace elements present in sediment samples from varied natural background concentrations (FDEP, 1988).

Table 1. Summary of data collected during previous studies of sediment chemical analysis, Caloosahatchee River and Estuary, and contiguous bays, Lee County, Florida, 1978-88

[PAH, polycyclic aromatic hydrocarbons; PCBs, polychlorinated biphenyls; TOC, total organic carbon; TKN, total Kjedhal nitrogen; TP, total phosphorus; X, analyzed; -, not analyzed]

Site number	Sampling date	Latitude			Longitude			Constituents analyzed							
								Organic compounds			TOC	TKN	TP	Trace elements	Sediment size
		Degrees	Minutes	Seconds	Degrees	Minutes	Seconds	Pesticides	PCBs	PAH					
CLR-0001[1]	8/28/85	26	41	47	81	47	52	X	X	X	X	X	X	X	-
CLR-0002[1]	8/28/85	26	36	39	81	53	50	X	X	X	X	X	X	X	-
CLR-0003[1]	8/28/85	26	36	7	81	54	5	X	X	X	X	X	X	X	-
CLR-0004[1]	8/28/85	26	32	8	81	56	48	X	X	X	X	X	X	X	-
CLR-0005[1]	8/28/85	26	31	43	81	58	26	X	X	X	X	X	X	X	-
SCB-0001[1]	8/28/85	26	30	32	82	1	4	X	X	X	X	X	X	X	-
EST-0001[1]	9/23/86	26	24	49	81	52	0	X	X	X	X	X	X	X	-
CBBI[2]	1986-87	26	30	52	82	2	4	X	X	X	X	-	-	X	X
CBFM[2]	1988	26	33	30	81	55	22	X	X	X	X	-	-	X	X
S-79[3]	1978	26	43	25	81	41	55	-	X	-	-	-	-	X	-
CH-27[4]	1982	26	31	46	81	59	52	X	X	X	-	X	X	X	X

[1]Seal, Thomas, Florida Department of Environmental Protection, written commun.,1999. (CLR, Caloosahatchee River; SCB, San Carlos Bay; EST, Estero Bay).

[2]Cantillo, Adriana, National Oceanic and Atmospheric Administration, National Status and Trends, written commun., 1997; (CBBI, Charlotte Harbor-Bird Island; CBFM, Charlotte Island-Ft. Myers).

[3]La Rose, H.R., and McPherson, B.F.,1983, Chemical and hydrologic assessment of the Caloosahatchee River Basin, Lake Okeechobee to Franklin Lock, Florida: U.S. Geological Survey, Water-Resources Investigations Report 83-4126.

[4]Stoker, Y.E., 1986, Water quality of the Charlotte Harbor estuarine system, Florida, November 1982 through October 1984: U.S. Geological Survey Open-File Report 85-563.

The statistical approach was based on the normalization of trace elements concentrations to aluminum concentrations in sediment samples. The FDEP stated that regression lines and the 95 percent confidence limits resulting from normalizing the data provided a valid statistical estimate of the range of values to be expected from samples collected from clean sediments (Natural Range) in Florida (FDEP, 1988, p. 29). Data points plotting above the upper 95 percent confidence limit corresponded to “Above Natural Range (enrichment)”; data points plotting below the lower 95 percent confidence limit corresponded to “Below Natural Range (possible analytical error)”. A detailed discussion about the development of this statistical method is described in “A guide to the interpretation of metal concentrations in estuarine sediments” (FDEP, 1988).

The FDEP developed effects-based sediment quality assessment guidelines (SQAGs) as a cost-effective approach for screening chemical levels to estimate potential adverse biological effects (FDEP, 1994). The SQAGs may be used to:

- Assess the adverse biological effects that could, potentially, be associated with levels of sediment-associated contaminants.
- Evaluate existing sediment chemistry data, and rank areas of concern and chemicals of concern in terms of their potential to be associated with adverse biological effects.
- Evaluate existing data to determine if additional testing is needed to support regulatory decisions.

Three distinct ranges of contaminant concentrations were defined in the FDEP (1994) report: 1) a minimal effects range, 2) a possible effects range, and 3) a probable effects range. The upper limit of the minimal effects range was represented by the Threshold Effects Level (TEL). The TEL represents the upper limit of the range of sediment contaminant concentrations dominated by no adverse biological effects. The Probable Effects Level (PEL) represents the lower limit of the range of contaminant concentrations that are usually or always associated with adverse biological effects. The TEL and the PEL bracket the range of possible effects; data falling within this range suggest additional investigations.

Normalization of toxic organic compounds to TOC was used by the FDEP (1994) to account for the influence of organic carbon on the bioavailability of the organic compounds, and therefore the potential for toxicity. High TOC concentrations will tend to reduce the bioavailability of toxic organic compounds by effectively sequestering them in the sediments (FDEP, 1994).

Two USGS reports contain information about chemical constituents in bottom sediments of the Caloosahatchee River and Estuary. LaRose and McPherson (1983) collected samples from four sites upstream of the Franklin Lock (S-79) and Stoker (1986) collected samples from five sites across a transect at the mouth of the estuary at Shell Point (table 1, plate 1).

Information about discharges that may affect the water quality of the Caloosahatchee watershed can be found at the Environmental Protection Agency’s Index of Watershed Indicators web site (**www.epa.gov/surf2**). The web site contains environmental uses and discharges (provided by EPA Envirofacts) and facilities regulated by EPA including hazardous waste facilities (Resources Conservation Recovery Act – RCRA); superfund sites (Comprehensive Environmental Response, Compensation, and Liability Act – CERCLA); and toxic releases (Toxic Release inventory – TRI).

DESCRIPTION OF STUDY AREA

The study area encompasses a 1.3-mile length of the Caloosahatchee River upstream from the Franklin Lock (S-79) (River), the entire tidally affected length of the river (estuary) and the contiguous water bodies of Matlacha Pass, San Carlos Bay, Estero Bay, Tarpon Bay, and Pine Island Sound (plate 1). Boundaries of the contiguous water bodies are based on the delineation reported by Goodwin (1991). The estuary has 16 tributaries and two major cities, Cape Coral and Fort Myers. Cape Coral is on the west bank, and Fort Myers is on the east bank. The city of Cape Coral, with a population of approximately 84,000 (Pierce, 1995), has about 400 miles (mi) of canals that honeycomb the entire city. Of the 400 mi, about 130 mi are tidally affected (Goodwin, 1991). The city of Fort Myers has a population of approximately 46,000 (Pierce, 1995), and does not have a canal system like Cape Coral. Runoff from areas of Cape Coral, Fort Myers, and some unincorporated areas of Lee County discharge through stormwater conveyances into the Caloosahatchee River estuary (Tony Pellicer, Natural Resource Manager, Lee County, Florida, verbal commun., 1999).

SAMPLING STRATEGY

The sampling strategy for the study was developed with the cooperation of a technical advisory group assembled by the District. The strategy specified the collection of approximately the top 1-centimeter (cm) of soft bottom-sediment samples at 60 selected sites and the physical and chemical characterization of the sediment samples (excluding rocks, sand, gravel, and vegetation). A sampling and analysis step diagram is presented in figure 2.

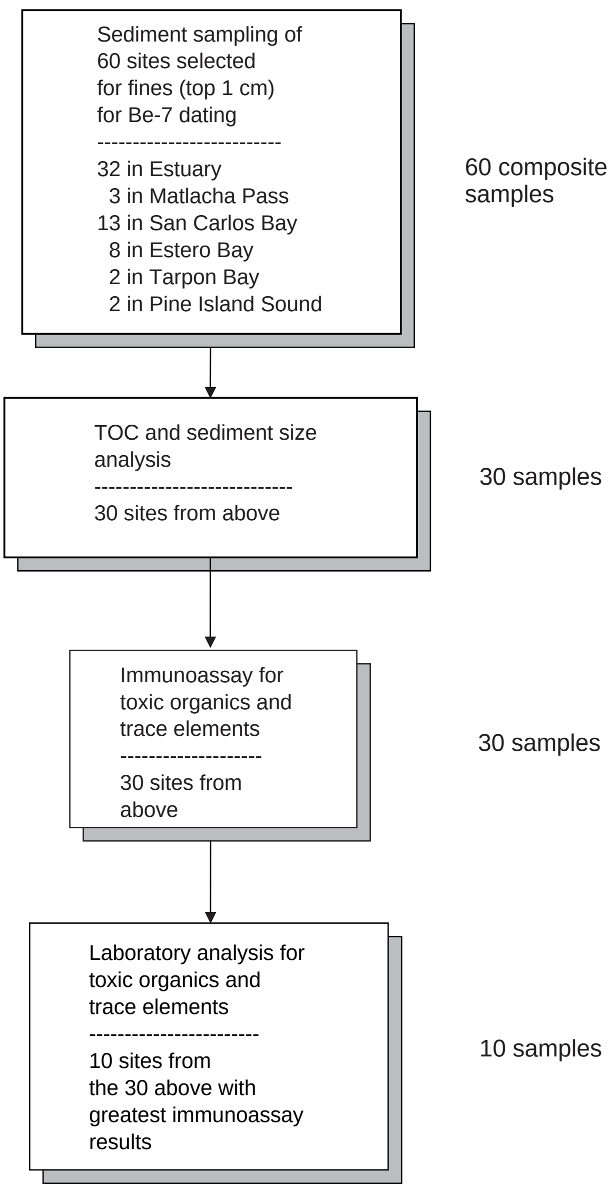


Figure 2. Sampling and analysis steps for the Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998.

The characterization included short-term sediment accumulation patterns (determined from analyses of Beryllium-7 (^{7}Be), sediment-size distributions, concentrations of trace elements, total organic carbon, and selected toxic organic compounds. Locations of the 60 sites and number of samples collected are listed below:

- *Caloosahatchee River*: 32 samples in the estuary including 2 samples upstream of the Franklin Lock (fig. 1),
- *Matlacha Pass*: 3 samples,
- *San Carlos Bay*: 13 samples,
- *Estero Bay*: 8 samples,
- *Tarpon Bay*: 2 samples, and
- *Pine Island Sound*: 2 samples.

Fifty-nine of the 60 selected sites were sampled; one site, located in San Carlos Bay, was not sampled because the bottom sediments consisted of sand within a 1-mile radius. Initially, samples from the 59 sites would be analyzed for ^{7}Be to determine short-term sedimentation patterns. Samples from 30 sites with the most recent sedimentation based on the findings of the ^{7}Be survey were selected for sediment-size distribution, scans for trace elements, total organic carbon, and semiquantitative analysis of toxic organic compounds.

Subsequently, based on the analytical findings for the 30 selected sites, samples from the 10 sites with the greatest percentage of fine sediments and concentrations of chemical constituents were analyzed by a contract laboratory. The 10 samples sent to the laboratory were analyzed for organochlorine and organophosphorus pesticides, PCBs, PAHs, and selected trace elements.

SAMPLE COLLECTION AND ANALYSIS METHODS

This section describes the sediment collection method and analytical methods used in this report.

Collection, Preparation, and Preservation of Sediment Samples

The descriptive information (site number, latitude and longitude, name of surface-water body, distance downstream from the Franklin Lock (S-79), date sampled, and depth to the top of the sediment layer) about the sediment-sampling sites in the study area is presented in table 2. Visual, mechanical, and depth-sounding methods were used to locate areas of recent sediment deposition (less than 6 months).

Table 2. Bottom-sediment sampling sites in the Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998

[Site number and site location same as previous study except when noted by (n): (n), previous site is near the site sampled in this report; Previously reported, previously reported data collected by C (Crean and Chamberlain (1985), or H (Haunert, 1978); ---, not previously sampled; (miles), miles upstream from the confluence with the Caloosahatchee River Estuary; n, near the site sampled in this study; na, not applicable]

Site number		Latitude		Longitude		Surface-water body	Distance down-stream[1] (in miles)	Date sampled	Depth to sediments from surface (in feet)
This report	Previous report	Degrees	Minutes	Degrees	Minutes				
1	---	26	43.278	81	41.060	Caloosahatchee River[2]	-1.1	07/28/98	24.0
2	---	26	43.375	81	40.870	Caloosahatchee River[3]	-1.3	07/28/98	6.7
3	C-156[4]	26	43.576	81	42.650	Caloosahatchee River Estuary	0.7	07/20/98	9.5
4	C-159	26	43.061	81	45.045	Caloosahatchee River Estuary	3.1	07/20/98	8.3
5	H-6[5]	26	42.154	81	46.504	Caloosahatchee River Estuary	5.4	07/20/98	11.2
6	C-163	26	41.860	81	47.389	Caloosahatchee River Estuary	6.4	07/21/98	9.5
7	---	26	41.365	81	45.993	Orange River (3.5 miles)	6.8	07/21/98	11.0
8	C-165	26	41.793	81	47.764	Caloosahatchee River Estuary	6.8	07/21/98	3.5
9	---	26	42.115	81	49.876	Daughtrey Creek (0.6 mile)	9.6	07/30/98	4.2
10	C-167	26	41.948	81	48.659	Caloosahatchee River Estuary	8.1	07/21/98	5.2
11	C-169(n)	26	41.417	81	49.722	Caloosahatchee River Estuary	8.8	07/20/98	3.1
12	C-170	26	40.853	81	49.689	Caloosahatchee River Estuary	9.3	07/22/98	6.3
13	C-171	26	40.986	81	49.395	Caloosahatchee River Estuary	8.9	07/21/98	7.5
14	C-173(n)	26	0.637	81	50.989	Caloosahatchee River Estuary	10.5	07/22/98	5.3
15	C-174	26	40.326	81	51.479	Caloosahatchee River Estuary	10.3	07/22/98	6.5
16	---	26	39.477	81	51.631	Caloosahatchee River Estuary	11.9	07/22/98	6.5
17	---	26	39.171	81	50.720	Billy Creek (0.9 mile)	11.3	07/22/98	2.9
18	---	26	39.176	81	51.564	Caloosahatchee River Estuary	12.2	07/22/98	7.1
19	---	26	38.739	81	52.402	Caloosahatchee River Estuary	13.0	07/22/98	9.1
20	C-228	26	39.766	81	52.415	Caloosahatchee River Estuary	12.1	07/22/98	5.1
21	---	26	39.453	81	53.722	Yellow Fever Creek (0.1 mile)	13.7	07/22/98	9.5
22	---	26	38.548	81	53.756	Caloosahatchee River Estuary	14.2	07/22/98	7.0
23	C-227	26	37.678	81	53.502	Caloosahatchee River Estuary	14.9	07/22/98	8.1
24	---	26	36.130	81	51.874	Caloosahatchee River Estuary	17.0	07/23/98	3.9
25	---	26	36.068	81	53.667	Caloosahatchee River Estuary	16.7	07/23/98	2.2
26	---	26	35.457	81	54.145	Caloosahatchee River Estuary	17.6	07/23/98	9.6
27	---	26	32.620	81	55.79000	Caloosahatchee River Estuary	21.2	07/23/98	7.2
28	C-218(n)	26	32.218	81	56.29200	Caloosahatchee River Estuary	21.8	07/30/98	2.0
29	C-214(n)	26	31.780	81	58.78600	Caloosahatchee River Estuary	24.3	07/29/98	14.0
30	C-211	26	31.381	82	0.3090	San Carlos Bay	na	07/23/98	5.0
31	---	26	32.194	81	59.91600	Caloosahatchee River Estuary	26.7	07/24/98	15.8
32	---	26	0.509	82	1.611	San Carlos Bay	na	07/23/98	5.3
33	---	26	30.238	82	1.042	San Carlos Bay	na	07/30/98	5.5
34	---	26	29.910	82	1.027	San Carlos Bay	na	07/23/98	2.7
35	---	26	29.630	82	0.137	San Carlos Bay	na	07/30/98	1.5
36			Not sampled[6]				na		
37	C-192(n)	26	28.081	82	2.656	San Carlos Bay	na	07/29/98	21.0
38	C-188	26	29.404	82	5.221	San Carlos Bay	na	07/29/98	4.5
39	---	26	29.964	82	2.543	San Carlos Bay	na	07/29/98	4.4
40	C-191(n)	26	29.563	82	2.259	San Carlos Bay	na	07/29/98	3.1
40A	---	26	29.056	82	2.259	San Carlos Bay	na	07/29/98	10.7
41	---	26	29.056	82	2.031	San Carlos Bay	na	07/23/98	4.5
42	---	26	30.358	82	2.669	San Carlos Bay	na	07/23/98	2.7

Table 2. Bottom-sediment sampling sites in the Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998 (Continued)

[Site number and site location same as previous study except when noted by (n): (n), previous site is near the site sampled in this report; Previously reported, previously reported data collected by C (Crean and Chamberlain (1985), or H (Haunert, 1978); ---, not previously sampled; (miles), miles upstream from the confluence with the Caloosahatchee River Estuary; n, near the site sampled in this study; na, not applicable]

Site number		Latitude		Longitude		Surface-water body	Distance down-stream[1] (in miles)	Date sampled	Depth to sediments from surface (in feet)
This report	Previous report	Degrees	Minutes	Degrees	Minutes				
43	C-180	26	30.860	82	3.648	San Carlos Bay	na	07/29/98	5.3
44	C-175	26	31.693	82	3.465	Matlacha Pass	na	07/29/98	8.5
45	C-177(n)	26	31.712	82	2.349	Matlacha Pass	na	07/23/98	1.3
46	---	26	31.955	82	4.472	Matlacha Pass	na	07/29/98	1.5
47	---	26	27.927	82	4.993	Tarpon Bay	na	07/23/98	2.9
48	---	26	27.485	82	4.436	Tarpon Bay	na	07/23/98	8.0
49	---	26	28.589	82	7.889	Pine Island Sound	na	07/29/98	2.0
50	---	26	29.986	82	7.284	Pine Island Sound	na	07/29/98	5.5
51	---	26	27.310	81	57.011	Estero Bay	na	07/29/98	10.0
52	---	26	27.912	81	51.965	Estero Bay	na	07/28/98	4.1
53	---	26	27.569	81	52.223	Estero Bay	na	07/28/98	3.5
54	---	26	25.566	81	52.635	Estero Bay	na	07/24/98	6.3
55	---	26	24.014	81	51.176	Estero Bay	na	07/24/98	6.5
56	---	26	22.115	81	51.003	Estero Bay	na	07/28/98	11.0
57	---	26	21.103	81	50.964	Estero Bay	na	07/24/98	4.7
58	---	26	39.061	81	51.246	Billy Creek (0.4 mile)	12.1	07/22/98	1.9
59	---	26	26.337	81	53.866	Estero Bay	na	07/24/98	3.7
60	---	26	32.635	81	58.486	Caloosahatchee River Estuary	23.8	07/30/98	10.4

[1]Locations of bottom-sediment sampling sites in the estuary are referenced to midstream distances in miles downstream from the Franklin Lock (S-79).

[2]Above Franklin Lock (S-79).

[3]Oxbow above Franklin Lock (S-79).

[4]Site number for data collected by Crean and Chamberlain in 1985.

[5]Site number for data collected by Haunert in 1978.

[6]Not sampled, bottom sediments consisted of sand within a 1-mile radius.

A Rockwell geographical positioning system (GPS) was used from the sampling boat to record latitude and longitude for each sampling site. Sediment samples were collected from approximately the top 1-cm at each site using an Eckman dredge with a messenger for soft sediments (rocks, sand, gravel, and vegetation were avoided). The samples collected for each site were combined and sealed in plastic bags, labeled, iced in the field, and stored in a laboratory freezer for processing. In preparation for analysis, the 59 frozen combined sediment samples were subdivided in the USGS laboratory with a heated nickel-chromium wire. One set of samples was thawed at room temperature; the other set of samples was kept frozen for future immunoassay and laboratory analysis. The thawed subset was divided into two parts: one part was dried in an oven at 60 °C for radioisotopes and trace elements, and the other part was analyzed for sediment-size analysis.

Identification of Short-Term Sedimentation Patterns Using Beryllium-7 Radiodating

The relative activity of ^{7}Be in the surface layer of the bottom sediments was used to identify the location of recently deposited material. ^{7}Be is a naturally produced radioisotope that is formed by

cosmic ray bombardment of atmospheric nitrogen (N) and oxygen (O). The ^{7}Be is transferred from the atmosphere to earth through precipitation (Geyh and Schleicher, 1990). This radioisotope is a highly reactive element that becomes rapidly and tightly associated with sedimentary substrata. ^{7}Be has a half-life of 53 days, it can be used as a tracer of sedimentation that has occurred within approximately the past 6 months. Thus, detection of ^{7}Be in the sediment indicates that the sediment and sedimentation patterns have been present for less than 6 months (Charles Holmes, USGS, verbal commun., 1998).

The 59 thawed samples were dried in an oven at 60ºC and then ground finely using a mortar and pestle. Fifty grams were sealed in counting jars for gamma emission detection. Gamma emissions were measured using a Canberra high-purity germanium detector with a PC-based multichannel analyzer. Each sample was counted for a minimum of 24 hours, and the ^{7}Be activity was calculated from the net area of the 477 kev (kiloelectron volts) photopeak. The ^{7}Be activity was decay-corrected to the date of sampling using the following equation:

$$A = A_o e^{-\lambda t} \qquad (1)$$

where,

A is the activity, decay-corrected to the date of sampling,
A_o is the measured activity,
λ is the ^{7}Be decay constant, and
t is the time since collection.

The results were reported as ^{7}Be disintegrations per minute per gram of sample (dpm/g) and statistical counting error.

Analysis for Sediment Size

The purpose of collecting bottom sediment for size analysis was to determine the distribution of fine sediments (silt and clays) because the amount of silt and clay-sized particles impacts the chemical properties of the sediments. Size analyses were performed on 30 sediment samples to determine the distribution of fine sediments (silts and clays). Potential sources of sediment particles for an estuary include rivers, net sediment flux from the marine environment, overland runoff, and anthropogenic point sources (Schoellhamer, 1991). Fine sediments can be resuspended into the water column, adsorb organic compounds and trace elements that may be present, and then become a vehicle for transport and redeposition of the sorbed organic compounds and trace elements.

A wet sieve analysis was performed on the samples as described by Matthes (1992). The analysis included 8 mesh sizes: >4, >2, >1, >0. 5, >0.25, >0.125, >0.0625, and <0.0625 millimeters. The sieved fractions were dried in an oven at 60º C, cooled, weighed, and the percentage of each fraction determined.

Scans for Trace Elements

Scans for trace elements were performed by a USGS contract laboratory on 30 sediment samples for 30 trace elements including seven trace elements often associated with anthropogenic activities. The selected trace elements included arsenic, cadmium, chromium, copper, lead, nickel, and zinc.

The samples were dried and then digested in a 4-acid digestion (HNO_3-$HClO_4$-HF-HCl) procedure. Digested samples were analyzed for 30 trace elements by an inductive coupled plasma/atomic emission spectroscopy analytical method. The 30 trace elements analyzed are listed below:

Aluminum	Iron	Silver
Antimony	Lead	Sodium
Arsenic	Magnesium	Strontium
Barium	Manganese	Tin
Bismuth	Molybdenum	Titanium
Cadmium	Nickel	Tungsten
Calcium	Phosphorus	Vanadium
Chromium	Potassium	Yttrium
Cobalt	Scandium	Zinc
Copper	Selenium	Zirconium

Analysis for Total Organic Carbon

Thirty sediment samples were sent to a contract laboratory for TOC analysis using EPA Method SW-9040/E415.1. TOC was used to identify the distribution of the total organic constituents in the sediments and to normalize the toxic organic compounds. The total organic constituents included those that are naturally occurring organic compounds (marine life residue and tannins from vegetation decay) and anthropogenic organic (toxic) compounds.

Immunoassay Analysis for Toxic Organic Compounds

Immunoassay technology was used at the USGS North Carolina District's laboratory to semiquantitatively identify anthropogenic organic compounds in 30 samples. This technology is based on biologically generated “immunoglobulin” proteins (antibodies) reacting with specific target compounds (antigens). Highly specific antibodies for target compounds, such as chlorinated pesticides, PCBs, and carcinogenic PAHs (CaPAHs) have been developed for use in environmental immunoassays. The antigen-antibody complexes of specific target compounds provided a high degree of analytical specificity.

Competitive enzyme-linked immunosorbent assay (ELISA) was used in this study (Strategic Diagnostics Inc., 1998). In competitive ELISAs, the unlabeled analyte (liquid extract of the sediment sample) is combined with a labeled enzyme analog of the analyte and the analyte specific antibody. Both the unlabeled and the enzyme-labeled (Horse Radish Peroxidase) analytes competed for a limited number of antibody sites, and bonded to antibodies in direct proportions to their relative concentrations in the reactive mixture. After an incubation period, the antigen-antibody complexes were separated from the unbound substances by decanting the liquid. Reagents were added to the complexes and a color developed which was read in a spectrophotometer. The color was proportional to the enzyme-labeled analyte and inversely proportional to the concentration of the sample analyte. The targeted toxic organic compounds, chlorinated pesticides, and PCBs were analyzed using the ELISA competitive method; CaPAHs were analyzed by ELISA/paramagnetic particle analysis.

In the paramagnetic particle analysis procedure, an enzyme-labeled CaPAH (enzyme conjugate) was added to the sample followed by paramagnetic particles with antibodies specific to CaPAHs. Both the sample and the enzyme conjugate competed for antibody sites on the magnetic particles. At the end of an incubation period, a magnetic field was applied to hold the paramagnetic particles that have the sample’s CaPAH and the enzyme conjugate bound to the antibodies on the particle. The sample’s CaPAH and the enzyme conjugate were bound in proportion to their original concentration in the tube. After the attached particles were washed, an enzyme substrate and chromogen was added and a color was developed during an incubation period. Because the enzyme conjugate was in competition with the unlabeled CaPAHs in the sample for antibody sites on the paramagnetic particles, the color was, therefore, inversely proportional to the concentrations of CaPAHs in the sample.

As with all ELISA tests, cross-reactivity needs to be considered. Because more than one compound will react with the ELISA test, a positive result only indicates the presence of one or more compounds that are listed with the individual kits.

The DDT immunoassay test does not differntiate between DDT and other organochlorine compounds. The following organochlorine compounds yield positive results with this assay:

p,p’-DDT	DDA
p,p’-DDD	Chloropropylate
p,p’-DDE	Chlorobenzilate
o,p’-DDT	Dicofol
o,p’-DDD	Tetradifon
o,p’-DDE	

The calibrating standard used for the DDT assay was p,p’-DDT. The standard concentrations were 0.2, 1.0, and 10 parts per million (ppm). Two sample extracts were analyzed in duplicate for quality control (QC).

The cyclodiene immunoassay test does not differentiate between chlordane and other cyclodienes. The following cyclodiene compounds yield positive results with this assay:

Chlordane	Dieldrin
Aldrin	Heptachlor
Endosulfan	Toxaphene
Endrin	

The calibrating standard used for the cyclodiene assay was chlordane. The calibrating standard concentrations were 20, 100, and 590 parts per billion (ppb) (0.02, 0.1 and 0.59 ppm). Two sample extracts were analyzed in duplicate for QC.

The PCBs (Aroclors) immunoassay test does not differentiate between various Aroclors. The following Aroclor compounds yield positive results with this assay:

Aroclor 1016	Aroclor 1254
Aroclor 1221	Aroclor 1260
Aroclor 1232	Aroclor 1268
Aroclor 1242	Aroclor 1282
Aroclor 1248	

The calibrating standard used for the PCBs was Aroclor 1248. The calibrating standard concentrations were 1, 5, 10, and 50 ppm. Two sample extracts were analyzed in duplicate for QC.

The CaPAHs immunoassay test does not differentiate between various CaPAHs of the pyrene series, selected PAHs, creosote, and fuels. The following CaPAH compounds and mixtures yield positive results with this assay:

CaPAH Compounds

Acenaphthalene	Benzo[a]pyrene	Fluorene
Acenaphthylene	Benzo[g,h,i]perylene	Indeno[1,2,3-c,d]pyrene
Anthracene	Chrysene	Naphthlene
Benzo[a]anthracene	Dibenzo[a,h]anthracene	Phenanthrene
Benzo[k]fluoranthene	Fluoranthene	Pyrene
Benzo[b]fluoranthene		

CaPAH Mixtures

Cresote	Gasoline
Diesel Fuel	Heating Fuel
Fuel Oil #4	Jet A Fuel
Fuel Oil #5	Kerosene
Fuel Oil #6	

The calibrating standard used for the CaPAHs was benzo(a)pyrene. The calibrating standard concentrations were 0.1, 1.0, and 5.0 ppb. Two sample extracts were analyzed in duplicate for QC.

Laboratory Analysis for Toxic Organic Compounds and Trace Elements

Based on the preliminary findings for the 30 selected sites, 10 sites were selected by the technical advisory group for further laboratory analysis of pesticides, PCBs, PAHs, and selected trace elements. The technical advisory group selected the 10 sites based on the percentage of fine sediments, ^{7}Be activity, and concentrations of chemical constituents. The sites selected were site numbers 4, 12, 14, 18, 22, 26, 27, 30, 33, and 60. Samples from the 10 sites were analyzed according to EPA methods listed below:

Chemical Constituents	EPA analytical method
Pesticides	
Organochlorine	EPA Method SW-8080
Organophosphorus	EPA Method SW-8140
Polychlorinated Biphenyls	EPA Method SW-8080
Polycyclic Aromatic Hydrocarbons	EPA Method SW-8310
Selected Trace Elements:	
aluminum, arsenic, cadmium,	EPA Method SW-5910
chromium, copper, iron, lead,	EPA Method SW-5910
zinc, and	EPA Method SW-5910
mercury	EPA Method SW-7471A

CHEMICAL AND PHYSICAL CHARACTERISTICS OF SELECTED BOTTOM SEDIMENTS

This section of the report presents the results of physical and chemical analysis of bottom-sediment samples collected during the reconnaissance survey.

Short-Term Sedimentation Patterns Using Beryllium-7 Radiodating

The data for the ^{7}Be activity of bottom sediments from the 59 sites in the study area are presented in table 3. The data ranged from not detected to 10.17 dpm/g. Thirty-one of the 59 sites sampled had detectable ^{7}Be ranging between 0.95 and 10.17 dpm/g. The locations of the sites in table 3 are identified with reference to their respective surface-water body. There were 19 recent sedimentation sites in the river and estuary, and 12 recent sedimentation sites in the bays and tributaries. The locations of these sites are presented in plate 2.

Sediment Size

Fifty-nine bottom-sediment samples were analyzed for eight particle sizes. The sizes represent the distribution at the top 1-cm of the bottom sediments. The eight particle sizes included mesh sizes >4, >2, >1, >0.5, >0.25, >0.125, >0.0625, and <0.0625. The total fines are represented by the sum of the percentages from mesh sizes >0.0625 and <0.0625. The corresponding sieve number and phi size are presented with the percentage of each size in table 4. The total percent of fines in the estuary ranged from 10.06 (site 28) to 85.55 (site 31). The total percent of fines in the bays ranged from 39.21 (site 33) to 89.95 (site 51).

Trace Elements

Scans for trace elements are presented in tables 5 and 6. The concentrations of the trace elements, arsenic through zinc, were normalized to aluminum by superimposing the data from this study (tables 5 and 6) on the regression curves published by FDEP (1984).

Table 3. Beryllium-7 radioisotope activity on bottom-sediment samples collected in the Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998

[cm, centimeter; ^{7}Be, Beryllium-7; dpm/g, disintegrations per minute per gram; ±, statistical counting error; (miles), miles upstream from the confluence with the Caloosahatche River Estuary; Tr, trace, too low to quantify; na, no data; nd, not detected]

Site No.	Depth (cm)	Surface-water body	^{7}Be (dpm/g)	± dpm/g
1	0-1	Caloosahatchee River[2]	3.19	1.24
2	0-1	Caloosahatchee River[3]	10.00	2.17
3	0-1	Caloosahatchee River Estuary	3.99	1.15
4	0-1	Caloosahatchee River Estuary	5.75	1.60
5	0-1	Caloosahatchee River Estuary	1.02	0.02
6	0-1	Caloosahatchee River Estuary	Tr	na
7	0-1	Orange River (3.5 miles)	nd	na
8	0-1	Caloosahatchee River Estuary	nd	na
9	0-1	Daughtrey Creek (0.6 mile)	3.43	1.12
10	0-1	Caloosahatchee River Estuary	0.95	0.48
11	0-1	Caloosahatchee River Estuary	Tr	na
12	0-1	Caloosahatchee River Estuary	2.26	0.75
13	0-1	Caloosahatchee River Estuary	nd	na
14	0-1	Caloosahatchee River Estuary	4.71	1.05
15	0-1	Caloosahatchee River Estuary	3.88	1.01
16	0-1	Caloosahatchee River Estuary	2.20	0.95
17	0-1	Billy Creek (0.9 mile)	nd	na
18	0-1	Caloosahatchee River Estuary	5.34	1.00
19	0-1	Caloosahatchee River Estuary	5.25	0.98
20	0-1	Caloosahatchee River Estuary	2.37	0.66
21	0-1	Yellow Fever Creek (0.1 mile)	5.86	1.07
22	0-1	Caloosahatchee River Estuary	3.18	0.80
23	0-1	Caloosahatchee River Estuary	1.96	0.68
24	0-1	Caloosahatchee River Estuary	Tr	na
25	0-1	Caloosahatchee River Estuary	Tr	na
26	0-1	Caloosahatchee River Estuary	3.42	1.02
27	0-1	Caloosahatchee River Estuary	6.48	0.93
28	0-1	Caloosahatchee River Estuary	nd	na
29	0-1	Caloosahatchee River Estuary	1.31	0.60
30	0-1	San Carlos Bay	3.63	1.06
31	0-1	Caloosahatchee River Estuary	Tr	na
32	0-1	San Carlos Bay	Tr	na
33	0-1	San Carlos Bay	1.85	0.86
34	0-1	San Carlos Bay	2.45	0.70
35	0-1	San Carlos Bay	1.19	0.60
36		Not Sampled	na	na
37	0-1	San Carlos Bay	Tr	na
38	0-1	San Carlos Bay	2.24	0.65
39	0-1	San Carlos Bay	nd	na
40	0-1	San Carlos Bay	Tr	na
41	0-1	San Carlos Bay	nd	na
42	0-1	San Carlos Bay	nd	na
43	0-1	San Carlos Bay	nd	na
44	0-1	Matlacha Pass	2.80	0.96
45	0-1	Matlacha Pass	nd	na
46	0-1	Matlacha Pass	2.94	0.67

Table 3. Beryllium-7 radioisotope activity on bottom-sediment samples collected in the Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998 (Continued)

[cm, centimeter; ^{7}Be, Beryllium-7; dpm/g, disintegrations per minute per gram; ±, statistical counting error; (miles), miles upstream from the confluence with the Caloosahatche River Estuary; Tr, trace, too low to quantify; na, no data; nd, not detected]

Site No.	Depth (cm)	Surface-water body	^{7}Be (dpm/g)	± dpm/g
47	0-1	Tarpon Bay	1.66	0.55
48	0-1	Tarpon Bay	Tr	na
49	0-1	Pine Island Sound	nd	na
50	0-1	Pine Island Sound	Tr	na
51	0-1	Estero Bay	2.51	1.06
52	0-1	Estero Bay	nd	na
53	0-1	Estero Bay	nd	na
54	0-1	Estero Bay	Tr	na
55	0-1	Estero Bay	nd	na
56	0-1	Estero Bay	Tr	na
57	0-1	Estero Bay	Tr	na
58	0-1	Estero Bay	10.17	1.56
59	0-1	Estero Bay	nd	na
60	0-1	Caloosahatchee River Estuary	7.25	1.41

Table 4. Sediment size analyses on bottom-sediment samples collected in the Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998

[Sample depth is from 0 to 1 centimeter below the bottom sediments. Mesh size, in millimeters; >, greater than; <, less than]

	Sediment size								
Sieve No. Mesh size Phi size	5 >4 -2	10 >2 -1	18 >1 0	35 >0.5 1	60 >0.25 2	120 >0.125 3	230 >0.0625 4	<230 <0.0625 <4	
Site No.	Percent dry weight								Total fines[1]
1[2]	7.52	0.70	4.38	9.81	13.38	8.07	16.95	39.18	56.13
2[2]	0.11	0.21	2.57	21.76	10.11	11.55	11.51	42.17	53.68
3	0.08	0.08	1.17	5.30	3.36	14.01	23.04	52.96	76.00
4	0.54	0.24	4.31	9.74	8.50	5.20	14.86	56.62	71.47
5	0.33	0.64	1.42	3.35	22.36	35.95	26.23	9.72	35.95
6	0.15	0.26	0.50	1.84	19.13	35.99	33.50	8.63	42.13
7	2.75	3.75	2.09	4.15	37.95	13.80	17.08	18.44	35.52
8	0.14	0.34	0.70	0.86	8.35	64.57	22.31	2.74	25.04
9	0.78	2.55	2.68	3.53	12.64	26.06	30.66	21.11	51.76
10	26.96	0.69	0.82	0.63	8.67	27.32	26.80	8.12	34.91
11	0.56	0.89	0.60	0.67	3.03	51.39	38.89	3.98	42.86
12	0.50	1.17	2.46	3.66	8.48	39.77	28.80	15.16	43.96
13	2.40	1.91	4.16	4.30	17.23	34.68	20.62	14.71	35.32
14	1.12	0.90	1.62	2.15	3.48	13.05	19.44	58.22	77.67
15	0.24	1.62	1.96	2.96	5.17	26.71	34.91	26.43	61.34
16	0.35	3.52	3.59	2.10	5.49	38.18	39.69	7.08	46.77
17	0.63	0.43	0.38	0.97	24.21	52.47	14.12	6.79	20.91
18	20.87	2.32	1.79	1.26	0.87	10.40	22.30	40.19	62.49
19	0.39	0.37	0.67	1.06	2.69	21.28	46.26	27.29	73.55

Table 4. Sediment size analyses on bottom-sediment samples collected in the Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998 (Continued)

[Sample depth is from 0 to 1 centimeter below the bottom sediments. Mesh size, in millimeters;

	Sediment size								
Sieve No. Mesh size Phi size	5 >4 -2	10 >2 -1	18 >1 0	35 >0.5 1	60 >0.25 2	120 >0.125 3	230 >0.0625 4	<230 <0.0625 <4	
Site No.	**Percent dry weight**								**Total fines[1]**
20	0.72	0.96	1.41	1.25	3.11	27.36	34.49	30.70	65.19
21	1.39	1.07	1.58	2.12	4.06	11.08	50.99	27.71	78.70
22	1.32	2.29	2.74	2.58	4.20	23.99	44.34	18.54	62.88
23	0.56	0.22	0.34	0.35	1.00	42.86	47.33	7.33	54.67
24	0.14	0.25	0.39	0.47	4.35	53.13	40.30	0.97	41.27
25	0.08	0.09	0.14	0.17	8.73	63.29	27.03	0.48	27.50
26	0.00	0.08	0.47	0.49	0.99	29.36	45.68	22.92	68.61
27	0.22	0.31	0.67	0.70	1.29	21.98	45.70	29.13	74.83
28	0.01	0.01	0.02	0.34	30.52	59.03	9.42	0.64	10.06
29	0.02	0.22	0.54	0.76	7.82	48.11	34.12	8.41	42.52
30	1.61	5.07	12.05	7.77	4.95	10.46	11.35	46.74	58.09
31	0.00	0.04	0.22	4.03	3.00	7.16	16.98	68.56	85.55
32	0.03	0.02	0.23	0.30	1.86	21.94	64.29	11.34	75.63
33	2.66	7.57	4.14	3.00	8.54	34.88	26.43	12.78	39.21
34	0.06	0.16	0.11	0.07	0.74	38.65	43.52	16.70	60.22
35	0.72	0.10	0.65	0.57	3.54	22.04	37.50	34.87	72.37
36	Not sampled								
37	1.92	4.70	10.12	5.21	3.83	17.17	29.75	27.29	57.05
38	0.13	0.07	0.30	0.15	0.15	13.61	55.52	30.07	85.59
39	0.08	0.20	0.44	0.38	1.48	38.32	50.75	8.35	59.10
40	0.18	0.20	0.27	0.25	4.19	44.54	36.29	14.08	50.37
41	0.73	0.22	0.39	0.54	3.06	32.16	49.84	13.06	62.90
42	0.20	0.10	0.18	0.40	2.04	32.94	51.68	12.46	64.14
43	0.10	0.15	0.43	0.40	2.36	30.45	61.19	4.92	66.11
44	0.03	0.20	0.29	0.27	3.84	45.78	38.58	11.01	49.60
45	0.00	0.02	0.03	0.05	2.12	39.33	56.93	1.52	58.45
46	0.45	0.08	0.28	0.78	1.44	43.73	35.80	17.45	53.25
47	0.85	0.63	0.52	0.34	0.50	19.84	58.10	19.22	77.32
48	0.00	0.10	0.11	0.32	1.38	28.08	62.07	7.94	70.01
49	0.30	0.25	0.32	1.74	4.94	48.31	35.24	8.88	44.13
50	0.21	0.58	0.52	0.57	2.47	28.00	61.01	6.65	67.66
51	0.00	0.03	0.25	0.46	0.71	8.60	24.79	65.16	89.95
52	0.29	0.25	0.28	0.36	8.46	49.44	32.50	8.42	40.92
53	0.00	0.17	0.25	0.38	2.12	36.97	49.75	10.36	60.11
54	0.19	0.26	0.29	0.58	4.21	47.87	31.57	15.02	46.59
55	0.00	0.02	0.05	0.05	1.20	32.36	41.59	24.72	66.31
56	0.00	0.11	0.09	0.21	0.92	14.40	56.35	27.92	84.27
57	0.00	0.02	0.14	0.24	0.53	14.50	28.56	56.02	84.58
58	3.43	2.26	2.44	1.45	3.18	48.08	19.75	19.40	39.15
59	0.22	0.28	0.27	0.45	2.21	53.63	38.80	4.14	42.94
60	0.00	0.88	2.84	3.44	2.85	3.60	4.04	82.35	86.39

[1]Total fines, sum of 230 (coarse silt) and <230 (silt and clay).

[2]Sites 1 and 2 located above Franklin Lock (S-79).

Table 5. Scans for trace elements on selected bottom-sediment samples collected in the Caloosahatchee River and Estuary, Lee County, Florida, July 20-30, 1998

[Sites 1 and 2 located upstream from Franklin Lock (S-79); distance downstream from Franklin Lock; Concentration in parts per million; D, duplicate sample; <, less than; NG, no guidelines]

Site number	Distance downstream (in miles)	Concentration							
		Aluminum	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
1	1.1	34,800	<5	2.0	74	36	17	16	77
2	1.3	33,600	<5	1.2	58	34	19	19	80
2D	1.3	36,600	<5	1.0	65	36	21	21	88
3	0.7	33,300	<5	1.2	58	32	20	18	78
4	3.1	31,300	<5	1.3	58	34	19	16	76
5	5.4	7,100	<5	0.4	18	7	5	4	17
12	9.3	12,400	<5	0.4	30	14	10	6	44
12D	9.3	11,000	<5	0.5	27	13	8	5	41
15	10.3	14,300	<5	0.7	34	16	13	8	50
14	10.5	23,700	<5	1.1	49	24	20	11	79
16	11.9	1,700	<10	<5	8	5	5	1	<1
20	12.1	7,100	<5	<4	12	9	9	3	26
18	12.2	24,000	<5	1.0	66	55	39	13	161
19	13.0	17,000	<5	0.7	54	34	38	9	120
21	13.7	26,000	8.00	1.1	73	56	32	32	150
22	14.2	12,600	<5	5.0	33	14	12	6	48
22D	14.2	12,600	<5	<4	33	14	12	6	49
23	14.9	4,700	<5	<4	15	5	5	2	19
26	17.6	8,500	<5	0.4	25	9	10	7	30
27	21.2	16,900	<5	0.6	40	30	18	9	74
29	21.8	2,600	<5	<4	10	2	<5	2	8
60	23.8	27,800	<5	0.9	81	34	25	18	94
		Sediment quality assessment guidelines for trace elements[1]							
	TEL[2]	NG	7.24	0.676	52.3	18.7	30.2	15.6	124
	PEL[3]	NG	41.6	4.21	160	108	112	42.8	271

[1]Sediment Quality Assessment Guidelines, helps address concerns relative to contamination of coastal ecosystems with substances that tend to be associated with sediments (FDEP, 1994).

[2]TEL, Threshold Effects Level, defines the upper limit of the range of sediment contaminant concentrations dominated by no effects data entries (minimal effect range).

[3]PEL, Probable Effects Level, defines the lower limit of the range of sediment contaminant concentrations that are usually or always associated with adverse effects.

Table 6. Scans for trace elements on selected bottom-sediment samples collected in the contiguous bays and tributaries to the Caloosahatchee River Estuary, Lee County, Florida, July 20-30, 1998

[Concentration in parts per million; D, duplicate sample; <, less than; NG, no guidelines]

Site No.	Location	Concentration							
		Aluminum	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
9	Daughtrey Creek	6,000	<10	0.5	24	21	15	7	2
9D	Daughtrey Creek	4,200	<10	<0.5	19	21	14	5	2
30	San Carlos Bay	4,300	<10	<0.5	22	7	8	3	1
33	San Carlos Bay	1,400	<10	<0.5	8	2	3	1	<1
34	San Carlos Bay	2,500	<10	<0.5	14	4	5	3	<1
35	San Carlos Bay	10,600	<5	<0.4	34	8	10	5	21
35D	San Carlos Bay	13,100	<5	0.4	38	11	11	6	26
38	San Carlos Bay	12,900	5	0.4	40	9	10	8	28
44	San Carlos Bay	6,600	<10	<0.5	30	11	11	8	25
44D	San Carlos Bay	6,600	<10	<0.5	27	7	6	7	16
46	Matlacha Pass	17,800	<5	<0.4	40	12	18	13	26
47	Tarpon Bay	5,600	<5	<0.4	20	4	5	5	8
51	Estero Bay	13,400	<10	0.6	87	29	15	12	47
58	Billy Creek	5,400	<10	1.1	62	64	100	14	318
		Sediment Quality Assessment Guidelines for trace elements[1]							
	TEL[2]	NG	7.24	0.676	52.3	18.7	30.2	15.6	124
	PEL[3]	NG	41.6	4.21	160	108	112	42.8	271

[1]Sediment Quality Assessment Guidelines, helps address concerns relative to contamination of coastal ecosystems with substances that tend to be associated with sediments (FDEP, 1994).

[2]TEL, Threshold Effects Level, defines the upper limit of the range of sediment contaminant concentrations dominated by no effects data entries (minimal effect range).

[3]PEL, Probable Effects Level, defines the lower limit of the range of sediment contaminant concentrations that are usually or always associated with adverse effects.

Figures 3 to 9 provide a visual representation of where the bottom sediments in this study plot relative to FDEP's upper and lower 95 percent prediction limits for Natural Range. By superimposing the data from this study on FDEP's regression curves, several observations were noted:

- *Arsenic*: All samples plotted within the Natural Range,
- *Cadmium*: 17 samples plotted above the upper limits,
- *Chromium*: 6 samples plotted above the upper limits,
- *Copper*: 8 samples plotted above the upper limits,
- *Nickel*: All samples plotted within the Natural Range,
- *Lead*: 8 samples plotted above the upper limits, and
- *Zinc*: 18 samples plotted above the upper limits.

Plate 3 shows a map locating the sites from which samples were scanned and the number of sites with trace elements above the Natural Range.

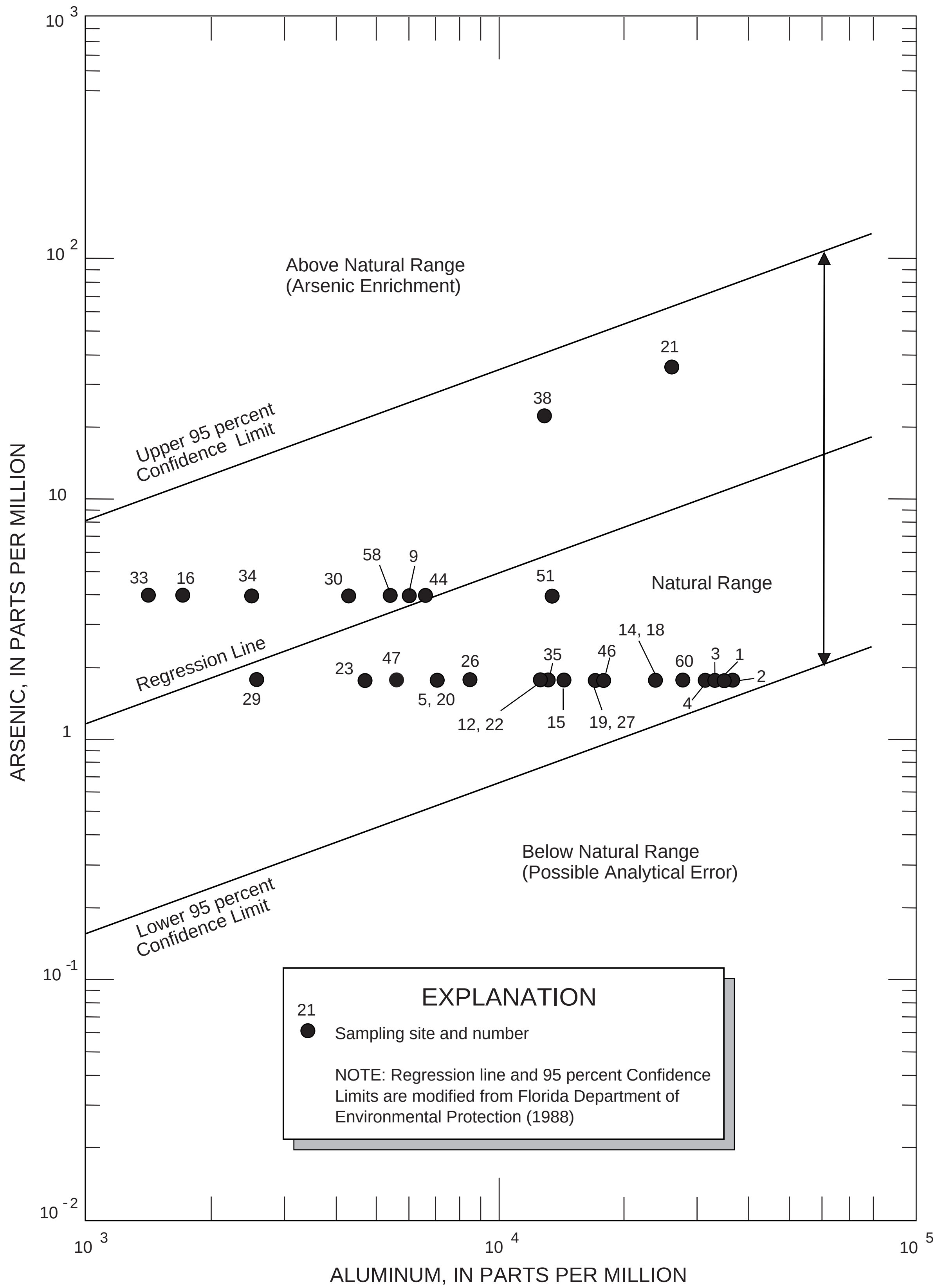


Figure 3. Arsenic concentrations normalized to aluminum concentrations for 30 bottom-sediment samples compared to Florida Department of Environmental Protection regression line and prediction limits, Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998.

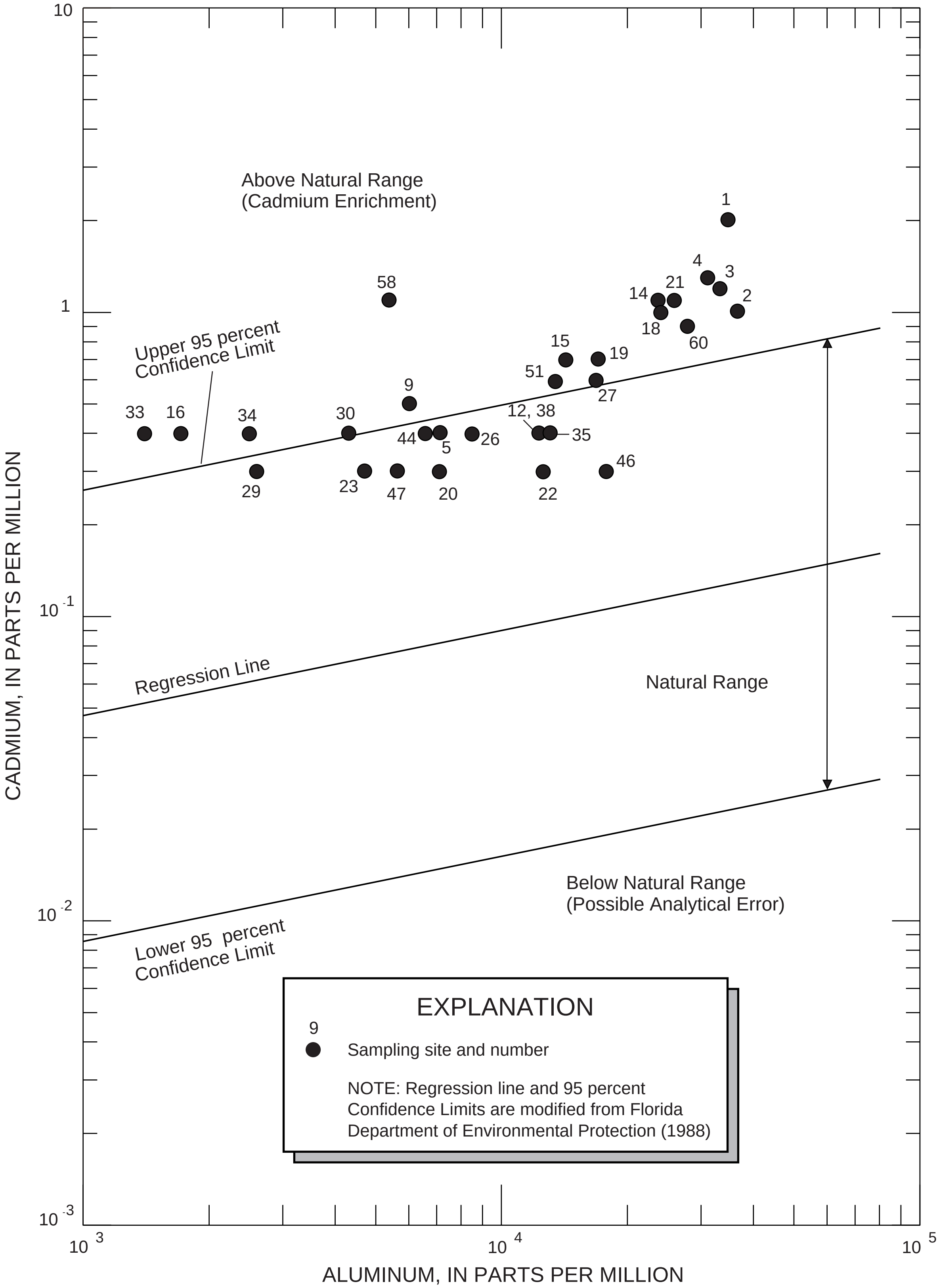


Figure 4. Cadmium concentrations normalized to aluminum concentrations for 30 bottom-sediment samples compared to Florida Department of Environmental Protection regression line and prediction limits, Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998.

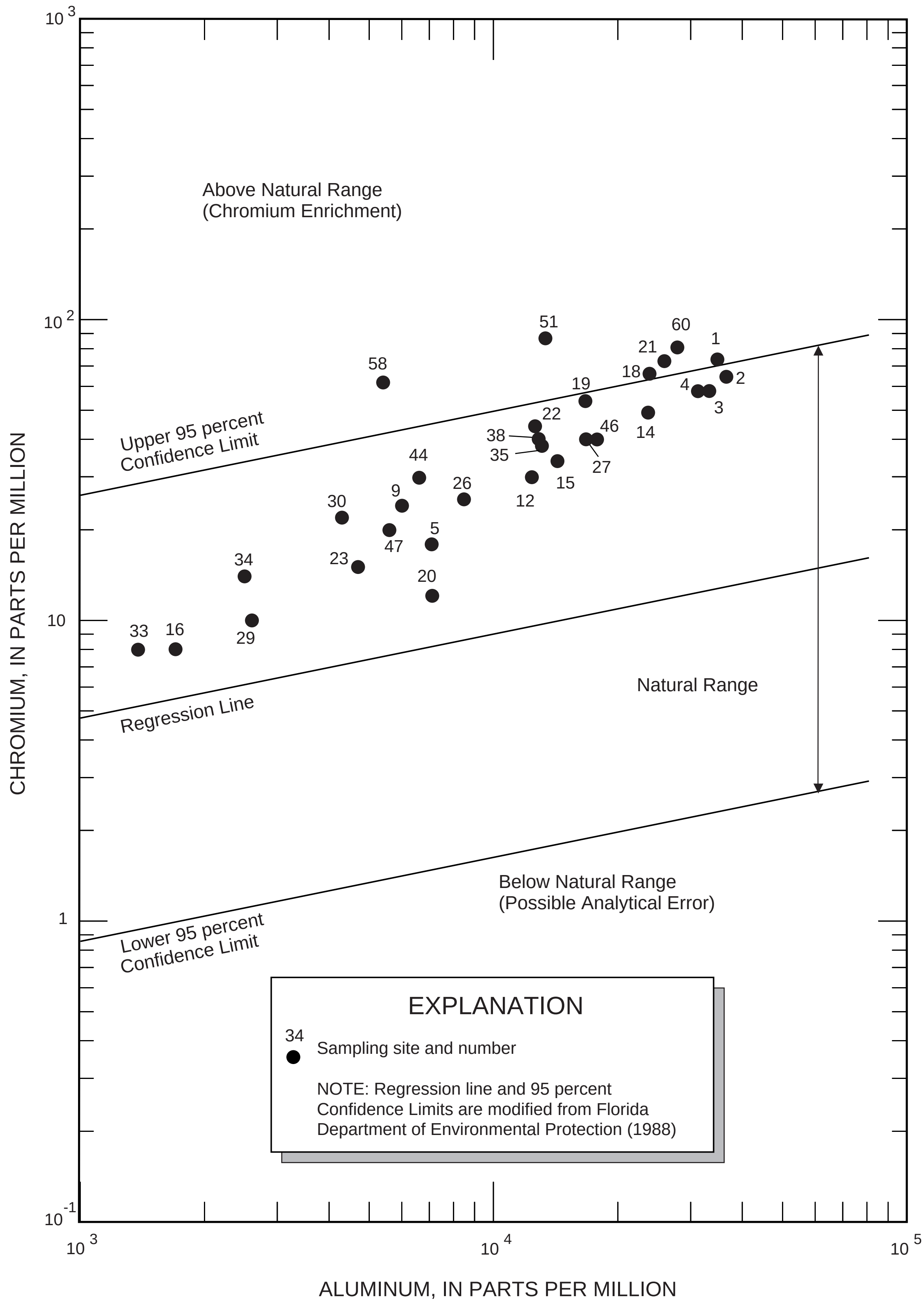


Figure 5. Chromium concentrations normalized to aluminum concentrations for 30 bottom-sediment samples compared to Florida Department of Environmental Protection regression line and prediction limits, Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998.

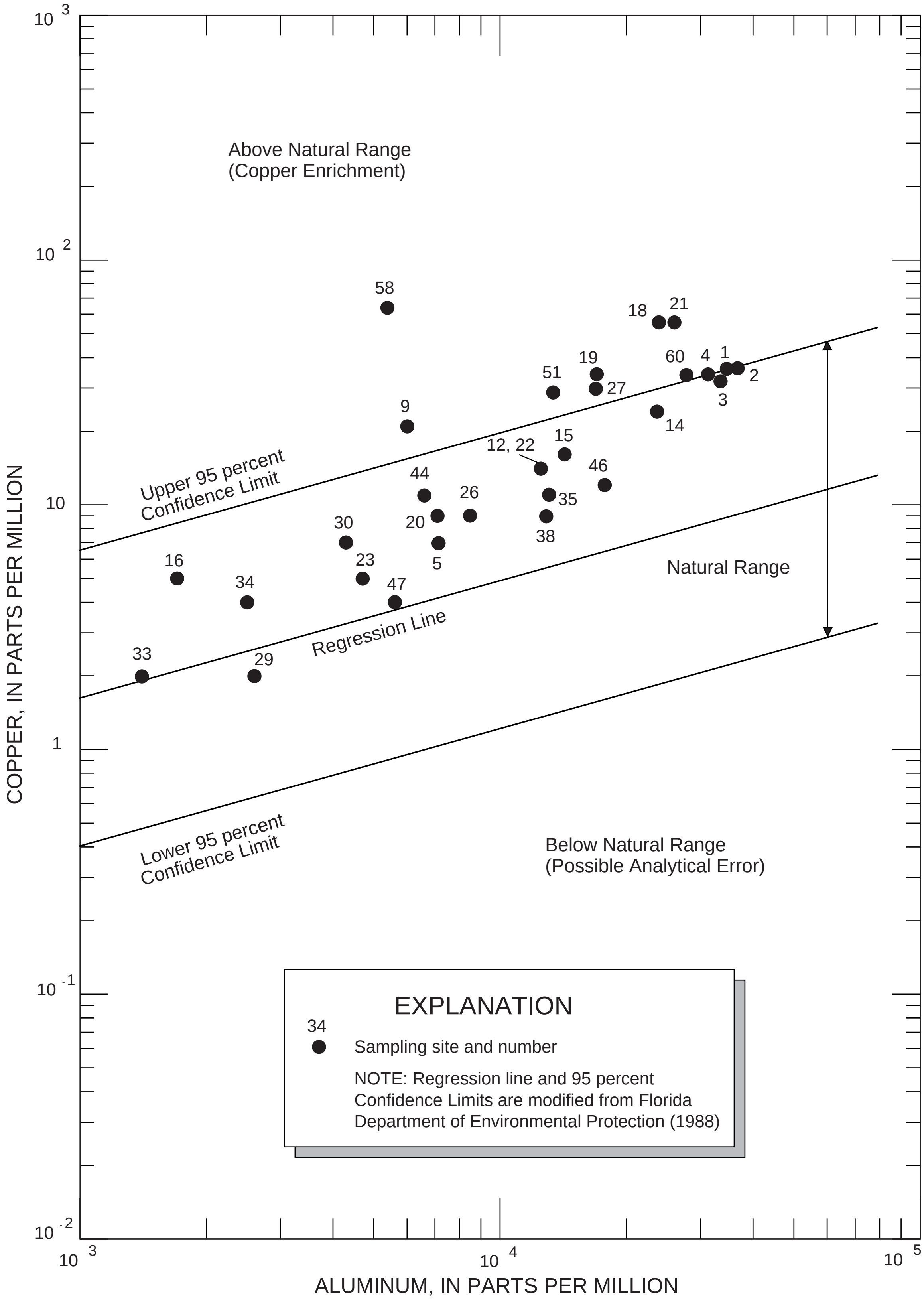


Figure 6. Copper concentrations normalized to aluminum concentrations for 30 bottom-sediment samples compared to Florida Department of Environmental Protection regression line and prediction limits, Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998.

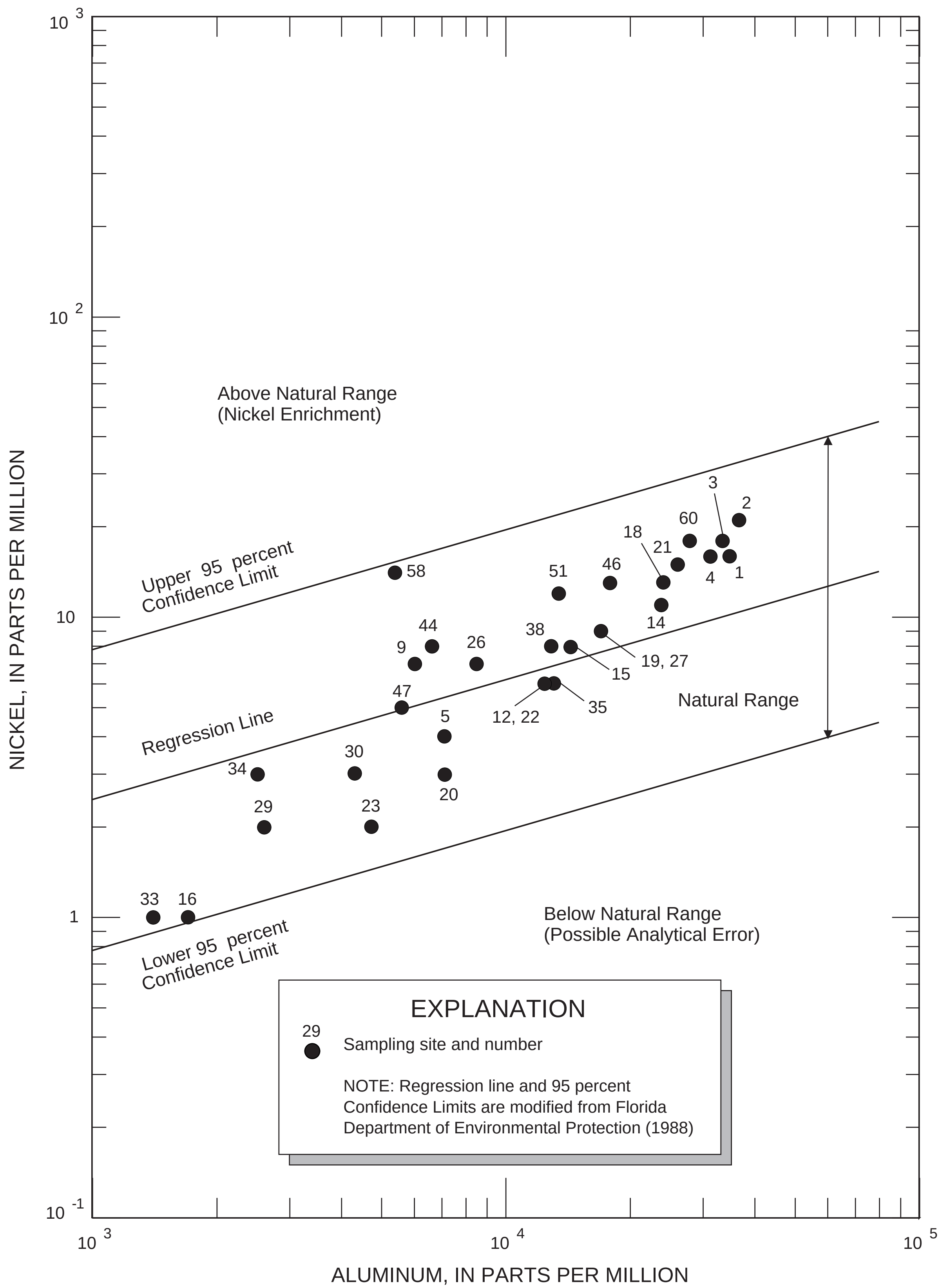


Figure 7. Nickel concentrations normalized to aluminum concentrations for 30 bottom-sediment samples compared to Florida Department of Environmental Protection regression line and prediction limits, Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998.

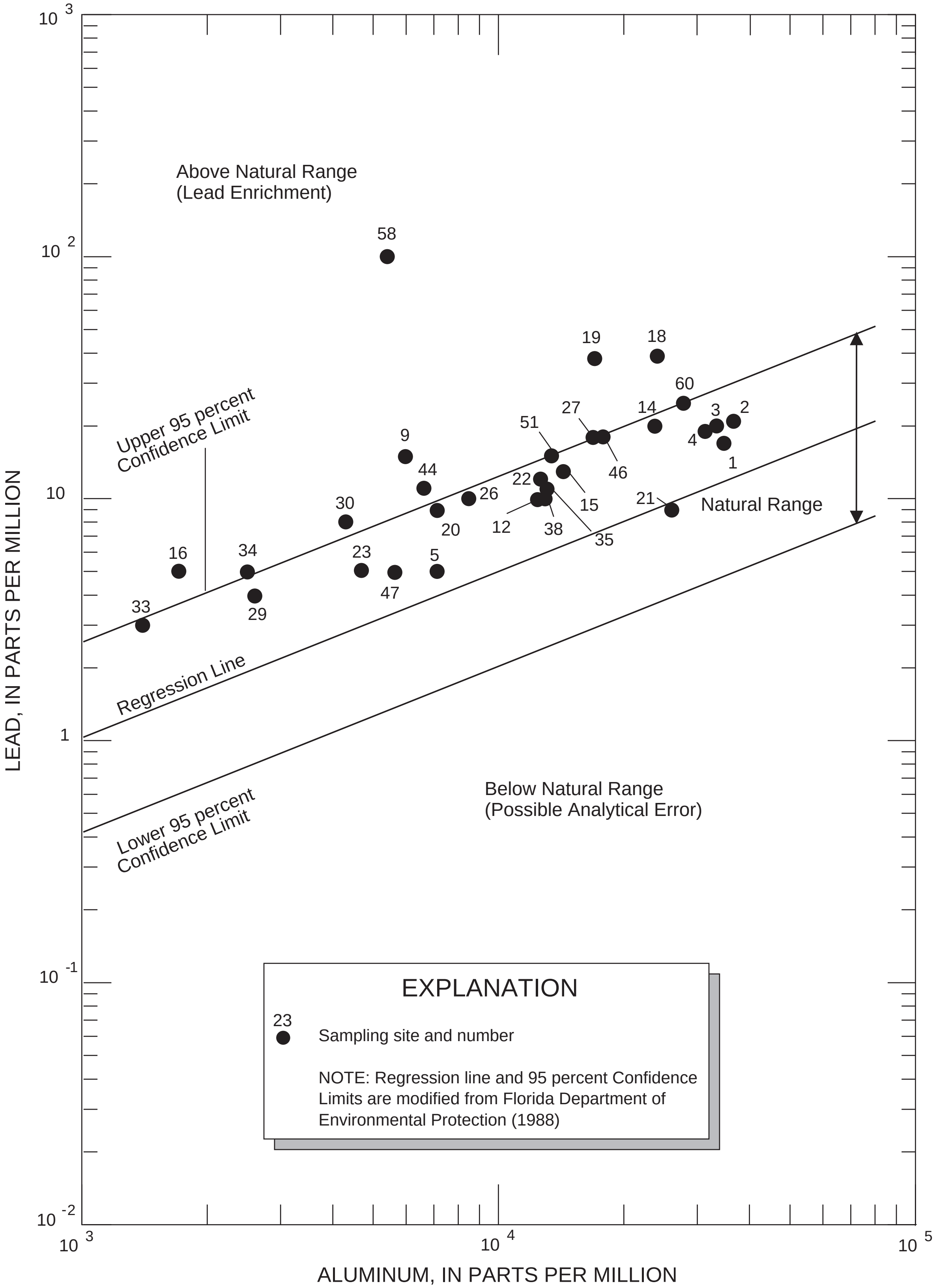


Figure 8. Lead concentrations normalized to aluminum concentrations for 30 bottom-sediment samples compared to Florida Department of Environmental Protection regression line and prediction limits, Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998.

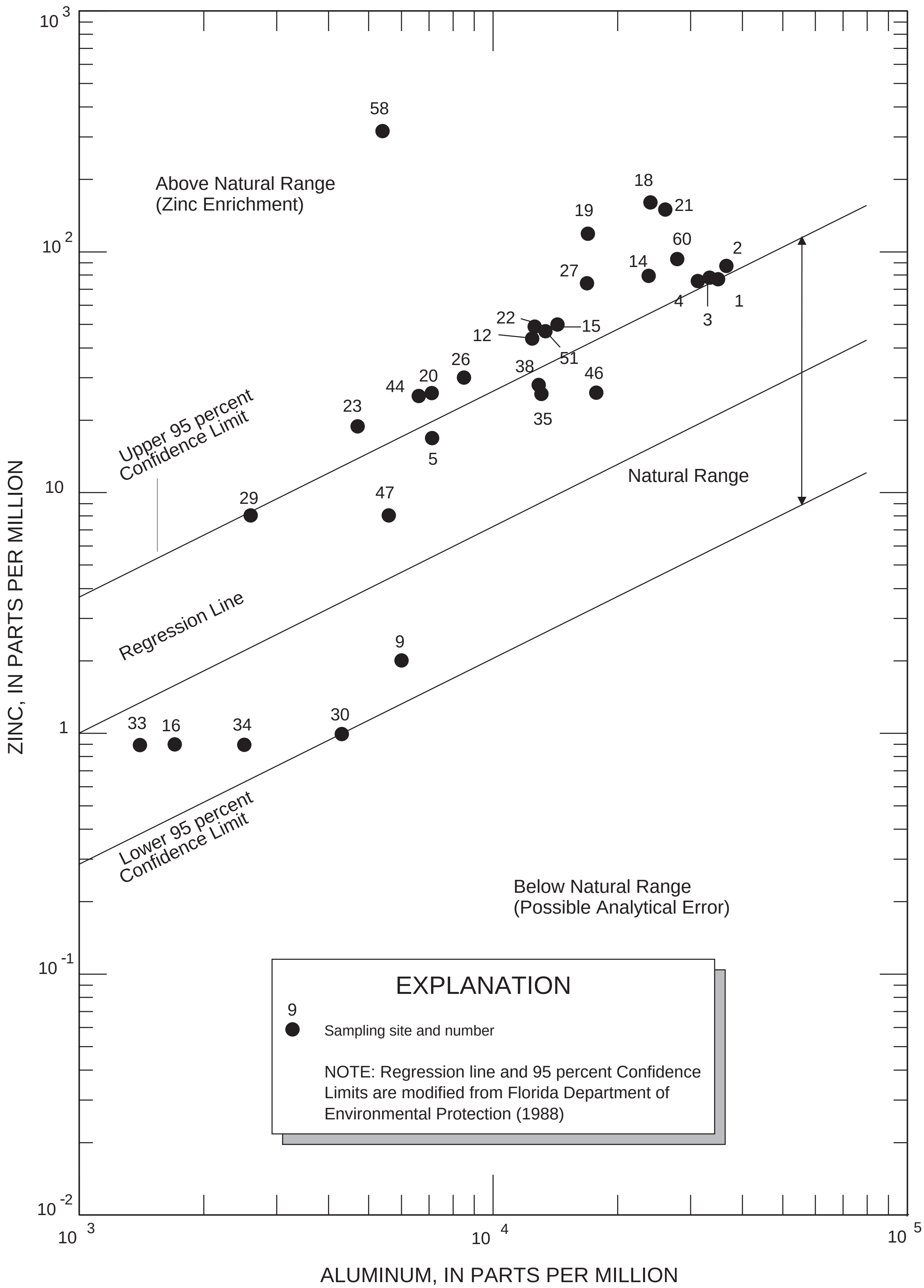


Figure 9. Zinc concentrations normalized to aluminum concentrations for 30 bottom-sediment samples compared to Florida Department of Environmental Protection regression line and prediction limits, Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998.

Total Organic Carbon

TOC analyses of the 30 bottom-sediment samples collected in the study area are presented in table 7 and plate 4. The data for the Caloosahatchee River and Estuary are referenced to the respective site numbers and distance in miles above and below the Franklin Lock (S-79); data for the bays and tributaries are referenced only to the site numbers. TOC concentrations in the bottom sediments of the river and estuary ranged from 4,600 to 164,000 ppm; TOC concentrations in the bays and tributaries ranged from 4,290 to 142,000 ppm.

Immunoassay Results for Toxic Organic Compounds

ELISA analyses for the 30 bottom-sediment samples collected in the study area are presented in table 8 and plates 5, 6, and 7. The SQAGs that were established by FDEP (1994) are presented in table 8. At 11 sites, the concentrations of the DDT ELISA tests were above the FDEP's PEL of 0.0517 mg/kg. All the sites had concentrations of cyclodienes as chlordane greater than the PEL. There were no samples that responded to the PCB ELISA test. All of the samples responded to the CaPAH ELISA test. The concentrations for CaPAH were below the TEL except for sites 19 and 58 which were above the TEL; there were no sites at or above the PEL. PEL defines the lower limit of the range of contaminant concentrations that are usually or always associated with adverse biological effects, whereas TEL defines the upper limit of the range of sediment contaminant concentrations dominated by the minimal effects range (FDEP, 1994). As with all ELISA tests, cross-reactivity needs to be considered (Mike Meyer, USGS, verbal commun., 1999). Therefore, the data presented in table 8 do not absolutely indicate that any individual compound exceeded the PEL. However, the data do suggest that quantitative analyses should be performed on samples to determine which compounds responded to the different ELISA tests and if any of these compounds exceeded the PEL.

Table 7. Laboratory analyses for total organic carbon on selected bottom-sediment samples collected in the Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998

[TOC, total organic carbon; ppm, parts per million]

Sites in the Caloosahatchee River and Estuary

Site No.	Distance downstream (in miles)	TOC (ppm)	Site No.	Distance downstream (in miles)	TOC (ppm)
1	-1.1	74,800	18	12.2	36,600
2	-1.3	164,000	19	13.0	16,400
3	0.7	149,000	21	13.7	90,600
4	3.1	124,000	22	14.2	26,000
5	5.4	30,600	23	14.9	4,600
12	9.3	29,100	26	17.6	20,600
14	10.5	69,900	27	21.2	26,700
15	10.3	34,500	29	24.3	5,570
16	11.9	17,700	60	23.8	54,300
20	12.1	71,400			

Sites in bays and tributaries to the Caloosahatchee River estuary

Site No.	Location	TOC (ppm)	Site No.	Location	TOC (ppm)
9	Daughtrey Creek	142,000	44	San Carlos Bay	4,290
30	San Carlos Bay	33,400	46	Matlacha Pass	27,500
33	San Carlos Bay	6,800	47	Matlacha Pass	10,000
34	San Carlos Bay	11,800	51	Estero Bay	27,500
35	San Carlos Bay	30,700	58	Billy Creek	34,300
38	San Carlos Bay	26,700			

Table 8. Immunoassay screening on selected bottom-sediment samples collected in the Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998

[Site number, site numbers 1 and 2 are sites located above the Franklin Lock (S-79); Distance downstream from Franklin Lock (S-79); PCBs, polychlorinated biphenyls; mg/kg, milligrams per kilogram; µg/kg, micrograms per kilogram; <, less than; >, greater than; concentrations based on dry weight; DDT, includes DDT metabolites; PCBs, polychlorobiphenyls; CaPAH, carcinogenic polycyclic hydrocarbons]

Site No.	Distance down-stream (in miles)	DDT[1] mg/kg	Chlordane[2] mg/kg	PCBs[3] mg/kg	CaPAH[4] µg/kg
Sites in the Caloosahatchee River and Estuary					
1	-1.1	0.89	1.49		239
2	-1.3	1.00	0.89	<0.25	15
3	0.7	<0.05	1.52		317
4	3.1	0.61	1.72	<0.25	333
5	5.4	<0.05	0.62		32
12	9.3	0.29	0.67		397
15	10.3	<0.05	1.02		314
14	10.5	<0.05	0.76	<0.25	183
16	11.9	<0.05	0.47	<0.25	177
20	12.1	0.23	0.47		335
18	12.2	<0.05	1.17		1378
19	13.0	<0.05	0.88	<0.25	1894
21	13.7	>0.05 but <0.1	1.62	<0.25	620
22	14.2	<0.05	1.01		401
23	14.9	<0.05	0.29	<0.25	257
26	17.6	<0.05	0.52		419
27	21.2	<0.05	0.68	<0.25	274
29	21.8	<0.05	0.37		81
60	23.8	>0.05 but <0.1	1.02	<0.25	131
9	Daughtrey Creek	>0.05 but <0.1	1.34	<0.25	310
30	San Carlos Bay	1.27	1.81	<0.25	221
33	San Carlos Bay	0.21	0.41		33
34	San Carlos Bay	>0.05 but <0.1	0.89	<0.25	92
35	San Carlos Bay	<0.05	0.46		96
38	San Carlos Bay	>0.05 but <0.1	0.87	<0.25	100
44	San Carlos Bay	>0.05 but <0.1	0.33		23
46	Matlacha Pass	0.60	1.31	<0.25	195
47	Tarpon Bay	<0.05	0.77		23
51	Estero Bay	>0.05 but <0.1	0.82	<0.25	280
58	Billy Creek	1.64	1.21		1,914
Sediment Quality Assessment Guidelines[5]					
	TEL[6]	0.00389	0.00226	0.0216	1,684
	PEL[7]	0.0517	0.00479	0.189	16,770

[1]DDT, DDT test cross-reacts with DDTs, DDEs, DDDs, DDA, chloropropylate, chlorobenzilate, dicofol, and tetradifon; concentrations may represent one, or the sum of part or all the compounds.

[2]Chlordane, chlordane test cross-reacts with aldrin, endosulfan, endrin, dieldrin , heptachlor, and toxaphene. Concentrations may represent one, or the sum of part or all of the compounds.

[3]PCBs, PCBs test cross-reacts with Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1268, and 1282; concentrations may represent one, or the sum of more than one compound.

[4]CaPAHs; CaPAHs test cross-reacts with the compounds below; concentrations may represent one, or the sum of part or all the compounds.

Benzo[a]pyrene	Phenanthrene	Fuel Oil #4
Benzo[a]anthracene	Benzo[g,h,i]perylene	Fuel Oil #5
Benzo[k]fluoranthene	Pyrene	Fuel Oil #6
Chrysene	Fluorene	Heating Fuel
Benzo[b]fluoranthene	Naphthalene	Diesel Fuel
Indeno[1,2,3-c,d]pyrene	Acenaphthalene	Gasoline
Dibenzo[a,h]anthracene	Creosote	Kerosene
Anthracene	Fluoranthene	Jet A Fuel
Acenaphthylene		

[5]Sediment Quality Assessment Guidelines based on dry basis. FDEP suggests that SQAGs may be used to assess the adverse biological effects that could, potentially, be associated with levels of sediment-associated contaminants (FDEP, 1994).

[6]TEL,Threshold Effects Level, defines the upper limit of the range of sediment contaminant concentrations dominated by no effects data entries (FDEP, 1994).

[7]PEL, Probable Effects Level, defines the lower limit of the range of contaminant concentrations that are usually or always associated with adverse biological effects.

The concentrations of all samples that responded to the ELISA tests were normalized to the TOC concentration of each respective sample (FDEP, 1994). The normalized ELISA DDT test data for the sites in the river and estuary are presented in figure 10; the data for the bays and tributaries are presented in table 9. The normalized data for the ELISA Chlordane and CaPAH tests for the sites in the river and estuary are presented in figures 11 and 12 respectively; the data for the bays and tributaries are presented in table 9. The FDEP (1994) presents a discussion on the use of normalizing the sum of each group of organic compounds in a sample to the sample's TOC. The normalized toxic organic compound data can be used to compare the sampling sites on the relative potential impact on the benthic organisms at the respective sites (FDEP, 1994). The potential impact is relative to the size of the bar (figs. 10-12).

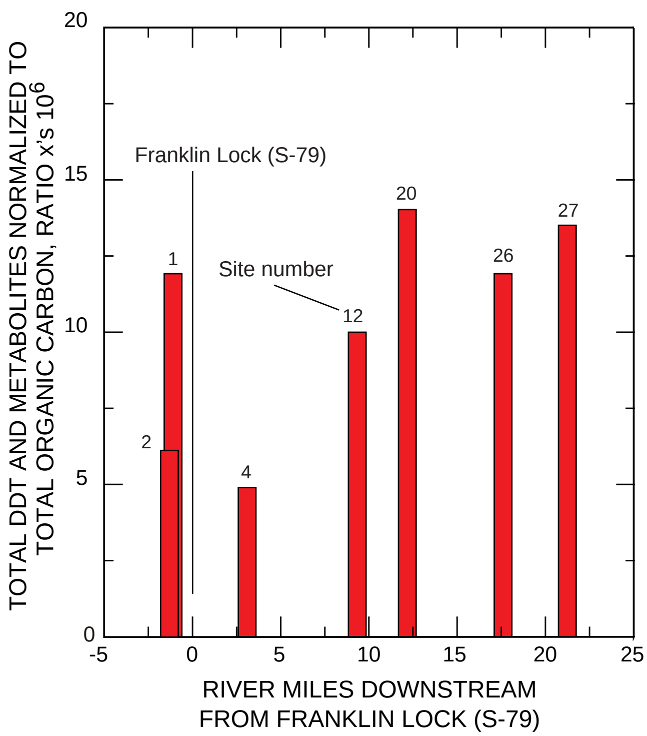


Figure 10. DDT enzyme-linked immunosorbent assay data normalized to total organic carbon, Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998.

Table 9. DDT, cyclodienes as chlordane, and carcinogenic polycyclic aromatic hydrocarbons normalized to total organic carbon on selected bottom-sediment samples collected in the contiguous bays and tributaries to the Caloosahatchee River Estuary, Lee County, Florida, July 20-30, 1998

[Factor, ratio multiplied by a number so that the ratio is reported as a whole number; NA, not applicable; reported findings are trace or not detected]

Site No.	Location	Ratio to total organic carbon x's factor		
		DDT [1]	Chlordane[2]	CaPAH[3]
9	Daughtrey Creek	NA	9	22
30	San Carlos Bay	38	54	66
33	San Carlos Bay	31	60	49
34	San Carlos Bay	NA	75	78
35	San Carlos Bay	NA	15	31
38	San Carlos Bay	NA	33	37
44	San Carlos Bay	NA	77	54
46	Matlacha Pass	22	48	71
47	Tarpon Bay	NA	77	23
51	Estero Bay	NA	30	102
58	Billy Creek	48	35	558

[1]Factor equals 10^6. DDT, DDT test cross-reacts with DDTs, DDEs, DDDs, DDA, chloropropylate, chlorobenzilate, dicofol, and tetradifon; concentrations may represent one, or the sum of part or all the compounds.

[2]Factor equals 10^6. Chlordane, chlordane test cross-reacts with the cyclodiene compounds aldrin, endosulfan, endrin, dieldrin, heptachlor, and toxaphene. Concentrations may represent one, or the sum of part or all the compounds.

[3]Factor equals 10^5. CaPAHs; CaPAHs test cross-reacts with the compounds below; concentrations may represent one, or the sum of part or all the compounds.

Benzo[a]pyrene	Acenaphthylene
Benzo[a]anthracene	Fluorene
Benzo[k]fluoranthene	Naphthalene
Chrysene	Creosote
Benzo[b]fluoranthene	Fuel Oil #4
Indeno[1,2,3-c,d]pyrene	Fuel Oil #5
Dibenzo[a,h]anthracene	Fuel Oil #6
Anthracene	Heating Fuel
Phenanthrene	Diesel Fuel
Benzo[g,h,i]perylene	Gasoline
Acenaphthalene	Kerosene
Pyrene	Jet A Fuel
Fluoranthene	

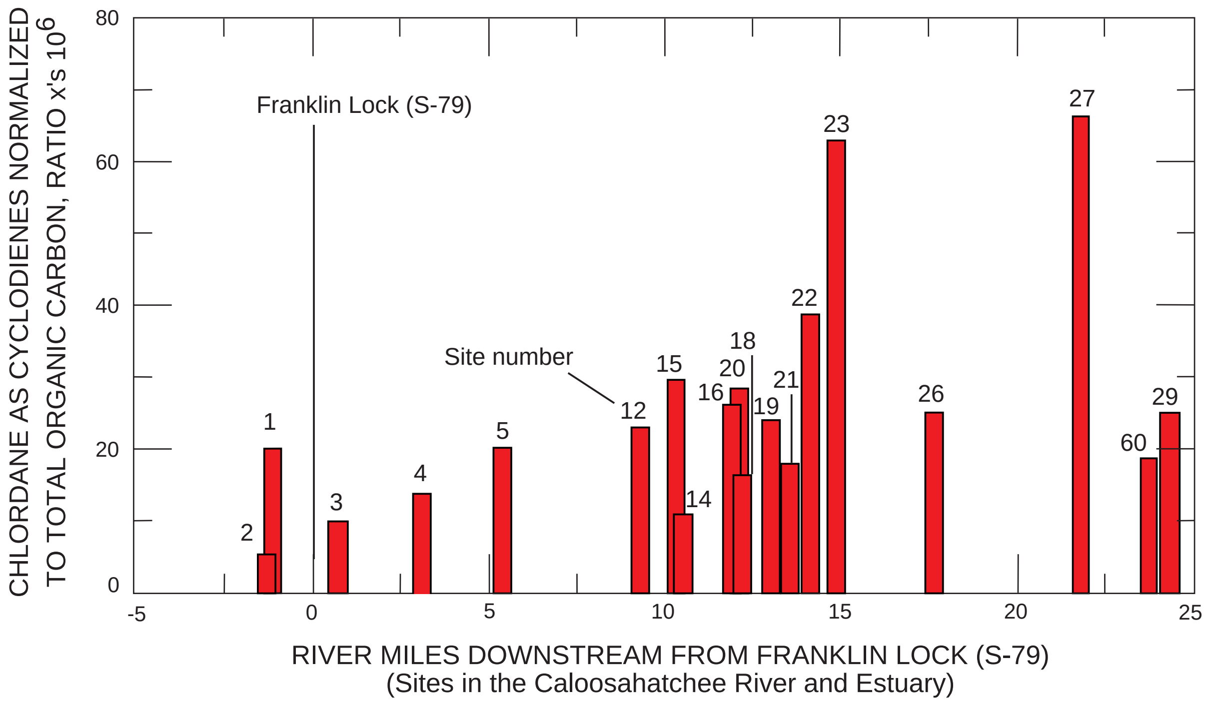


Figure 11. Chlordane enzyme-linked immunosorbent assay data normalized to total organic carbon, Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998.

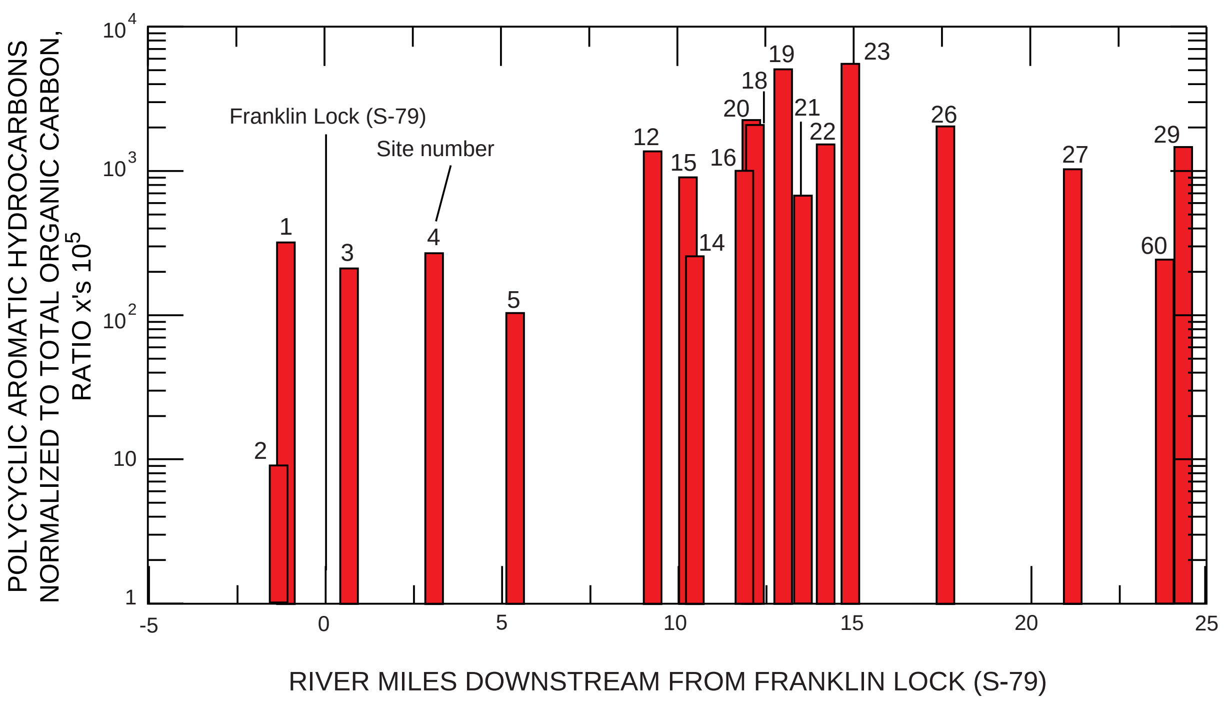


Figure 12. Carcinogenic polycyclic aromatic hydrocarbons enzyme-linked immunosorbent assay data normalized to total organic carbon, Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998.

Laboratory Results for 10 Selected Sites

The data for the bottom-sediment samples analyzed for toxic organic compounds and selected trace elements are presented in tables 10 and 11, and in the appendix. All the samples analyzed are from the Caloosahatchee River estuary. The reporting limits (detection limits) for the toxic organic compounds and trace elements varied with each sample because of the different moisture content of the samples. The reporting limits are directly related to the moisture content of the samples (Christina Mott, Quanterra Laboratories, verbal commun., April 1999).

Table 10. Laboratory analytical results for pesticides, polychlorinated biphenyls, and polycyclic aromatic hydrocarbons on 10 bottom-sediment samples collected in the Caloosahatchee River Estuary, Lee County, Florida, July 20-30, 1998

[µg/kg, micrograms per kilogram; PCBs, polychlorinated biphenyls; PAH, polycyclic aromatic hydrocarbon; nd, not detected; J, estimated result, result is less than reporting limit]

Site No.	Concentration							
	Pesticides							
	organo-chlorine[1]	µg/kg	organo-phosphorus[2]	µg/kg	PCBs[1]	µg/kg	PAH[3]	µg/kg
4	nd		nd		nd		Anthracene	130J
							Benzo(a)anthracene	150J
							Benzo(b)fluoranthene	840J
							Benzo(ghi)perylene	110J
							Benzo(k)fluoranthene	270J
							Fluoranthene	1,100J
12	4,4'-DDD	5.3J	nd		nd		Benzo(a)pyrene	120J
							Benzo(b)fluoranthene	240J
							Fluoranthene	230J
14	4,4'-DDD	3.3J	nd		nd		Benzo(a)anthracene	60J
							Benzo(a)pyrene	120J
							Benzo(b)fluoranthene	270
							Fluoranthene	210J
18	nd		nd		nd		Anthracene	95J
							Benzo(a)anthracene	940
							Fluoranthene	4,100
							Phenanthrene	730
							Pyrene	1,700
22	nd		nd		nd		Benzo(a)pyrene	58J
							Benzo(b)fluoranthene	91J
							Fluoranthene	78J
26	delta-BHC	3.8J	nd		nd		Benzo(a)pyrene	78
							Benzo(ghi)perylene	71J
							Benzo(k)fluoranthene	40J
							Fluoranthene	110J
27	gamma-BHC (Lindane)	1.5J	nd		nd		Benzo(k)fluoranthene	21J
							Fluoranthene	58J
							Fluorene	130
							Pyrene	57J
30	nd		nd		nd		nd	
33	nd		nd		nd		nd	
60	nd		nd		nd		Benzo(a)pyrene	120J
							Benzo(b)fluoranthene	190J

[1]Environmental Protection Agency Method SW8080A.
[2]Environmental Protection Agency Method SW8140.
[3]Environmental Protection Agency Method SW8310.

Table 11. Laboratory analytical results for trace elements on 10 bottom-sediment samples collected in the Caloosahatchee River Estuary, Lee County, Florida, July 20-30, 1998

[Concentration, in milligrams per kilogram; nd, not detected; na, not applicable; B, estimated result. Result is less than reporting limits]

Site No.	Concentration								
	Aluminum	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Mercury	Zinc
4	33,900	nd	nd	110.0	123.0	78,800	61.4B	nd	290
12	10,000	nd	nd	42.0	34.5	22,400	24.0B	nd	110
14	9,960	nd	nd	42.1	35.1	24,400	24.3B	0.21	119
18	15,200	nd	nd	78.2	107.0	35,700	72.2	nd	296
22	3,340	nd	nd	15.3	11.4	7,950	10.1B	nd	46.3
26	3,060	nd	nd	14.7	10.0	7,120	8.9B	nd	36.4
27	1,700	nd	nd	8.6	9.3	3,540	nd	nd	25.0
30	6,000	nd	nd	30.6	12.3	8,320	10.7B	nd	29.3
33	1,630	nd	nd	8.5	2.7B	2,220	nd	nd	7.4
60	26,300	nd	nd	127.0	80.4	41,400	55.5	nd	223
	Sediment Quality Assessment Guidelines[1]								
TEL[2]	na	7.24	0.676	52.3	18.7	na	30.2	0.13	124
PEL[3]	na	41.6	4.21	160	108	na	112	0.696	271

[1]Sediment Quality Assessment Guidelines, helps address concerns relative to contamination of coastal ecosystems with substances that tend to be associated with sediments (FDEP, 1994).

[2]TEL, Threshold Effects Level, defines the upper limit of the range of sediment contaminant concentrations dominated by no effects data entries (minimal effect range).

[3]PEL, Probable Effects Level, defines the lower limit of the range of sediment contaminant concentrations that are usually or always associated with adverse effects.

Toxic Organic Compounds

The toxic organic compounds in the estuary are reported as pesticides (organochlorine and organophosphorus), PCBs, and PAHs. There were 3 organochlorine pesticide compounds, 4,4'-DDD, delta-BHC, and gamma-BHC (Lindane), detected in sediment samples from four sites (sites 12,14, 26, and 27) (table 10, appendix). The concentrations of the DDD's and BHC's were all below the reporting limit. There were no organophosphorus pesticides or PCBs reported for the 10 sediment samples.

There were eight sites with detectable PAHs; however, only four sites (14, 18, 26, and 27) had reportable concentrations (table 10). The remaining sites (4, 12, 22, and 60) had concentrations less than the reportable limits for the method of analysis. There were no PAHs detected in sites 30 and 33.

Trace Elements

All 10 sites in the estuary had sediment samples with trace elements (table 11). No arsenic or cadmium was detected in the samples; however, aluminum, chromium, copper, iron, lead, mercury, and zinc were detected. The ranges of concentrations of the trace elements detected are listed below:

- *Aluminum*: from 1,630 to 33,900 mg/kg,
- *Chromium*: from 8.5 to 127 mg/kg,
- *Copper*: from 2.7 to 123 mg/kg,
- *Iron*: from 2,220 to 78,800 mg/kg,
- *Lead*: from not detected to 72.2 mg/kg,
- *Mercury*: from not detected to 0.21 mg/kg (only at one site), and
- *Zinc*: from 7.4 to 296 mg/kg

There were five sites with trace elements greater than the TEL and PEL. The five sites and the concentrations in mg/kg at each site are shown below.

Site No.	Chromium	Copper	Lead	Mercury	Zinc
4	110	123	61.4		290
12		34.5			
14		35.1		0.21	
18	78.2	107	72.2		296
60	127	80.4	55.5		223
TEL	52.3	18.7	30.2	0.13	124
PEL	160	108	112	0.696	271

SUMMARY

The South Florida Water Management District (District) is developing a Caloosahatchee River Water Management Plan to address environmental and water-supply needs of the Caloosahatchee watershed. The study area of this report includes the Caloosahatchee River and Estuary, and the contiguous water bodies of Matlacha Pass, San Carlos Bay, Estero Bay, Tarpon Bay, and Pine Island Sound, in Lee County. As part of this plan, the District will evaluate potential toxic substances in the sediments of the study area. The toxic substances include anthropogenic organic compounds (polynuclear aromatic hydrocarbons (PAH) organochlorine pesticides, organophosphorus pesticides), and trace elements. The data in this report provide chemical and physical characterization of sediments at selected sites in the study area.
The USGS reconnaissance survey consisted of the following activities:

- Determination of the chemistry and physical characteristics of 60 selected bottom sediment-sampling sites including 2 sites above the Franklin Lock (S-79), and
- Selection of 10 sampling sites for analysis of toxic organic compounds and selected trace elements. The 10 sites were selected from the 60 bottom sediment-sampling sites.

A technical advisory group, consisting of USGS and South Florida Water Management District personnel, selected the initial 60 sampling sites. Fifty-eight sites were located in the estuary, tributaries, and the bays; and two sites were located upstream of the Franklin Lock.

A sampling strategy was developed to provide chemical and physical characterization of bottom sediments at selected sites in the study area. The strategy was developed with the cooperation of the technical advisory group. The strategy specified collection of approximately the top 1-cm of bottom sediment samples at 60 selected sites and the physical and chemical characterization of the sediment samples. The characterization included short-term sediment accumulation patterns, sediment-size distribution, concentrations of trace elements, total organic carbon, and selected toxic organic compounds. Fifty-nine of the planned 60 sites were sampled; one site, located in San Carlos Bay, was not sampled because the bottom sediments consisted of sand within a 1-mile radius.

Bottom samples from 59 sites were analyzed for ^{7}Be activity; thirty-one of the 59 sites sampled had detectable ^{7}Be; nineteen in the river/estuary, and twelve in the bays and tributaries. Sediment-size distribution analysis was used to determine the extent of fine bottom sediments. The total percent of fines in the estuary ranged from 10.06 (site 28) to 85.55 (site 31). The total percent of fines in the bays ranged from 39.21 (site 33) to 89.95 (site 51).

Scans for trace elements were used to identify the presence of trace elements above Natural Range. The trace elements were differentiated from varied natural background concentrations by comparing data with FDEP regression curves based on the normalization of trace elements concentrations to aluminum concentration in the sample. Cadmium, chromium, copper, lead, and zinc were above Natural Range at some sites in the estuary and bays.

Total organic carbon analyses were used to identify the locations of carbonaceous sediments. TOC concentration in 30 selected sites ranged between 4,290 and 164,000 parts per million. The TOC from sediments in 18 sites in the river and estuary ranged between 4,600 (at site 23) and 164,000 parts per million (at site 2). The TOC in the bays and tributaries ranged between 4,290 at site 44 (Matlacha Pass) and 142,000 parts per million at site 9 (Daughtrey Creek).

Immunoassay analysis of competitive enzyme-linked immunosorbent assay (ELISA) was used to identify and estimate semiquantitatively the concentration of groups of toxic compounds. Three groups were identified; chlorinated pesticides (DDTs and cyclodienes as chlordane), polychlorinated biphenyls (Aroclors) and carcinogenic polycyclic aromatic hydrocarbons. All the concentrations from samples that responded to the DDT and Chlordane ELISA test were above the Florida Department of Environmental Protection's Probable Effect Level (PEL).

Laboratory analysis for toxic organic compounds and selected trace elements was performed on samples from 10 sites (4, 12, 14, 18, 22, 26, 27, 30, 33, and 60). The toxic organic compounds included the organochlorine and organophosphorus pesticides, PCBs, and PAHs. The selected trace elements included arsenic, cadmium, chromium, copper, iron, lead, mercury, and zinc. There were 3 organochlorine pesticide compounds, 4,4'-DDD, delta-BHC, and gamma-BHC (Lindane), detected in sediment samples from four sites (12,14, 26, and 27).

The concentrations of the DDD and BHC's were all below the reporting limit. There were no organophosphorus pesticides or PCBs reported for the 10 sediment samples. There were eight sites with detectable PAHs; however, only four sites (14, 18, 26, and 27) had concentrations equal to or greater than the reportable limit. Sites 4, 12, 22, and 60 had concentrations less than the reportable limit for the method of analysis. There were no PAHs detected in sites 30 and 33.

Trace elements at 10 sites were analyzed in the USGS contract laboratory. No arsenic and cadmium were detected in the samples; however, there were five sites (4, 12, 14, 18, and 60) with trace elements greater than the TEL or the PEL.

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Pellicer, Tony, Natural Resource Manager, Lee County, Florida, 1999, verbal communication.

Seal, Thomas, Florida Department of Environmental Protection, 1999, written communication.

Appendix

Analytical report for organic compounds and trace elements in 10 selected bottom-sediment samples, Caloosahatchee River and Estuary study area, Lee County, Florida, July 20-30, 1998

Quanterra

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
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ANALYTICAL REPORT

FL00108

Lot #: D9B240185

Richard Daddow

U.S. Geological Survey

QUANTERRA INCORPORATED

Christina M. Mott
Project Manager

May 24, 1999

Case Narrative

Lot D9B240185

This report has been revised to show the results as dry weight corrected.

Organophophorus Pesticides by GC, Method 8140

The spike compound, Ethyl Parathion, is reported above the acceptance limit for the Laboratory Control Samples. As the method blank and matrix spike samples are in control, and there are no samples that contain Ethyl Parathion above the reporting limit, the data are reported.

Polynuclear Aromatic Hydrocarbons by HPLC, Method 8310

The Relative Percent Difference value for Fluorene in the Laboratory Control Samples is reported above the acceptance limit. As the individual percent recoveries are in control, the data are reported.

Several percent recoveries and one RPD value are reported outside of the acceptance limits for several of the analytes for the matrix spike samples due to sample matrix.

With exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. All laboratory quality control samples analyzed in conjunction with the samples in this project were within established control limits.

EXECUTIVE SUMMARY - Detection Highlights

D9B240185

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
FL00108 SITE#4 02/22/99 001				
Anthracene	130 J	890	ug/kg	SW846 8310
Benzo(a)anthracene	150 J	890	ug/kg	SW846 8310
Benzo(b)fluoranthene	840 J	890	ug/kg	SW846 8310
Benzo(ghi)perylene	110 J	1800	ug/kg	SW846 8310
Benzo(k)fluoranthene	270 J	890	ug/kg	SW846 8310
Fluoranthene	1100 J	1800	ug/kg	SW846 8310
Aluminum	33900	223	mg/kg	SW846 6010B
Chromium	110	22.3	mg/kg	SW846 6010B
Copper	123	44.6	mg/kg	SW846 6010B
Iron	78800	223	mg/kg	SW846 6010B
Lead	61.4 B	112	mg/kg	SW846 6010B
Zinc	290	44.6	mg/kg	SW846 6010B
Percent Moisture	95.5	0.10	%	MCAWW 160.3 MOD
FL00108 SITE#12 02/22/99 002				
4,4'-DDD	5.3 J	24	ug/kg	SW846 8080A
Benzo(a)pyrene	120 J	290	ug/kg	SW846 8310
Benzo(b)fluoranthene	240 J	290	ug/kg	SW846 8310
Fluoranthene	230 J	570	ug/kg	SW846 8310
Aluminum	10000	71.8	mg/kg	SW846 6010B
Chromium	42.0	7.2	mg/kg	SW846 6010B
Copper	34.5	14.4	mg/kg	SW846 6010B
Iron	22400	71.8	mg/kg	SW846 6010B
Lead	24.0 B	35.9	mg/kg	SW846 6010B
Zinc	110	14.4	mg/kg	SW846 6010B
Percent Moisture	86.1	0.10	%	MCAWW 160.3 MOD
FL00108 SITE#14 02/22/99 003				
4,4'-DDD	3.3 J	19	ug/kg	SW846 8080A
Benzo(a)anthracene	60 J	230	ug/kg	SW846 8310
Benzo(a)pyrene	120 J	230	ug/kg	SW846 8310
Benzo(b)fluoranthene	270	230	ug/kg	SW846 8310
Fluoranthene	210 J	450	ug/kg	SW846 8310
Mercury	0.21	0.19	mg/kg	SW846 7471A
Aluminum	9960	56.6	mg/kg	SW846 6010B
Chromium	42.1	5.7	mg/kg	SW846 6010B
Copper	35.1	11.3	mg/kg	SW846 6010B
Iron	24400	56.6	mg/kg	SW846 6010B
Lead	24.3 B	28.3	mg/kg	SW846 6010B
Zinc	119	11.3	mg/kg	SW846 6010B
Percent Moisture	82.3	0.10	%	MCAWW 160.3 MOD

(Continued on next page)

EXECUTIVE SUMMARY - Detection Highlights

D9B240185

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
FL00108 SITE#18 02/22/99 004				
Anthracene	95 J	180	ug/kg	SW846 8310
Benzo(a)anthracene	940	180	ug/kg	SW846 8310
Fluoranthene	4100	360	ug/kg	SW846 8310
Phenanthrene	730	360	ug/kg	SW846 8310
Pyrene	1700	360	ug/kg	SW846 8310
Aluminum	15200	89.3	mg/kg	SW846 6010B
Chromium	78.2	8.9	mg/kg	SW846 6010B
Copper	107	17.9	mg/kg	SW846 6010B
Iron	35700	89.3	mg/kg	SW846 6010B
Lead	72.2	44.6	mg/kg	SW846 6010B
Zinc	296	17.9	mg/kg	SW846 6010B
Percent Moisture	88.8	0.10	%	MCAWW 160.3 MOD
FL00108 SITE#22 02/22/99 005				
Benzo(a)pyrene	58 J	140	ug/kg	SW846 8310
Benzo(b)fluoranthene	91 J	140	ug/kg	SW846 8310
Fluoranthene	78 J	280	ug/kg	SW846 8310
Aluminum	3340	34.7	mg/kg	SW846 6010B
Chromium	15.3	3.5	mg/kg	SW846 6010B
Copper	11.4	6.9	mg/kg	SW846 6010B
Iron	7950	34.7	mg/kg	SW846 6010B
Lead	10.1 B	17.3	mg/kg	SW846 6010B
Zinc	46.3	6.9	mg/kg	SW846 6010B
Percent Moisture	71.2	0.10	%	MCAWW 160.3 MOD
FL00108 SITE#26 02/22/99 006				
delta-BHC	3.8 J	5.5	ug/kg	SW846 8080A
Benzo(a)pyrene	78	65	ug/kg	SW846 8310
Benzo(ghi)perylene	71 J	130	ug/kg	SW846 8310
Benzo(k)fluoranthene	40 J	65	ug/kg	SW846 8310
Fluoranthene	110 J	130	ug/kg	SW846 8310
Aluminum	3060	32.5	mg/kg	SW846 6010B
Chromium	14.7	3.3	mg/kg	SW846 6010B
Copper	10	6.5	mg/kg	SW846 6010B
Iron	7120	32.5	mg/kg	SW846 6010B
Lead	8.9 B	16.3	mg/kg	SW846 6010B
Zinc	36.4	6.5	mg/kg	SW846 6010B
Percent Moisture	69.3	0.10	%	MCAWW 160.3 MOD

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EXECUTIVE SUMMARY - Detection Highlights

D9B240185

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
FL00108 SITE#27 02/22/99 007				
gamma-BHC (Lindane)	1.5 J	4.9	ug/kg	SW846 8080A
Benzo(k)fluoranthene	21 J	57	ug/kg	SW846 8310
Fluoranthene	58 J	110	ug/kg	SW846 8310
Fluorene	130	110	ug/kg	SW846 8310
Pyrene	57 J	110	ug/kg	SW846 8310
Aluminum	1700	28.6	mg/kg	SW846 6010B
Chromium	8.6	2.9	mg/kg	SW846 6010B
Copper	9.3	5.7	mg/kg	SW846 6010B
Iron	3540	28.6	mg/kg	SW846 6010B
Zinc	25.0	5.7	mg/kg	SW846 6010B
Percent Moisture	65.1	0.10	%	MCAWW 160.3 MOD
FL00108 SITE#30 02/22/99 008				
Aluminum	6000	42.4	mg/kg	SW846 6010B
Chromium	30.6	4.2	mg/kg	SW846 6010B
Copper	12.3	8.5	mg/kg	SW846 6010B
Iron	8320	42.4	mg/kg	SW846 6010B
Lead	10.7 B	21.2	mg/kg	SW846 6010B
Zinc	29.3	8.5	mg/kg	SW846 6010B
Percent Moisture	76.4	0.10	%	MCAWW 160.3 MOD
FL00108 SITE#60 02/22/99 009				
Benzo(a)pyrene	120 J	420	ug/kg	SW846 8310
Benzo(b)fluoranthene	190 J	420	ug/kg	SW846 8310
Aluminum	26300	105	mg/kg	SW846 6010B
Chromium	127	10.5	mg/kg	SW846 6010B
Copper	80.4	21.1	mg/kg	SW846 6010B
Iron	41400	105	mg/kg	SW846 6010B
Lead	55.5	52.7	mg/kg	SW846 6010B
Zinc	223	21.1	mg/kg	SW846 6010B
Percent Moisture	90.5	0.10	%	MCAWW 160.3 MOD
FL00108 SITE#33 02/22/99 010				
Aluminum	1630	26.1	mg/kg	SW846 6010B
Chromium	8.5	2.6	mg/kg	SW846 6010B
Copper	2.7 B	5.2	mg/kg	SW846 6010B
Iron	2220	26.1	mg/kg	SW846 6010B
Zinc	7.4	5.2	mg/kg	SW846 6010B
Percent Moisture	61.7	0.10	%	MCAWW 160.3 MOD

ANALYTICAL METHODS SUMMARY

D9B240185

PARAMETER	ANALYTICAL METHOD
Inductively Coupled Plasma (ICP) Metals	SW846 6010B
Mercury in Solid Waste (Manual Cold-Vapor)	SW846 7471A
Organochlorine Pesticides and PCBs	SW846 8080A
Organophosphorous Pesticides by GC	SW846 8140
Percent Moisture	MCAWW 160.3 MOD
Polynuclear Aromatic Hydrocarbons by HPLC	SW846 8310

References:

MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

PREPARATION METHODS SUMMARY

D9B240185

PREPARATION DESCRIPTION	PREPARATION METHOD	ANALYTICAL METHOD
Acid Digestion of Sediments, Sludges, Soils	SW846 3050B	SW846 6010B
Low Concentration Utrasonic Extraction	SW846 3550	SW846 8140
Low Concentration Utrasonic Extraction	SW846 3550	SW846 8310
Mercury sample preparation	SW846 7471A	SW846 7471A
Sonication-Low Level	SW846 8080A	SW846 8080A
Total Residue as Percent Moisture	MCAWW 160.3 MOD	MCAWW 160.3 MOD

References:

MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

METHOD / ANALYST SUMMARY

D9B240185

ANALYTICAL METHOD	ANALYST	ANALYST ID
MCAWW 160.3 MOD	Andrea Sporleder	001971
SW846 6010B	Tracy Anderson	009690
SW846 7471A	William G. Logan	002179
SW846 8080A	Mike Schmitt	005925
SW846 8140	Matthew Graves	001801
SW846 8310	Dane Rodgers	007407

References:

MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

SAMPLE SUMMARY

D9B240185

WO #	SAMPLE#	CLIENT SAMPLE ID	DATE	TIME
CR3CF	001	FL00108 SITE#4	02/22/99	
CR3DN	002	FL00108 SITE#12	02/22/99	
CR3DV	003	FL00108 SITE#14	02/22/99	
CR3E1	004	FL00108 SITE#18	02/22/99	
CR3E3	005	FL00108 SITE#22	02/22/99	
CR3E6	006	FL00108 SITE#26	02/22/99	
CR3E9	007	FL00108 SITE#27	02/22/99	
CR3EP	008	FL00108 SITE#30	02/22/99	
CR3EW	009	FL00108 SITE#60	02/22/99	
CR3F5	010	FL00108 SITE#33	02/22/99	

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#4

GC Semivolatiles

Lot-Sample #...:	D9B240185-001	**Work Order #...:**	CR3CF103	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	03/08/99	**Analysis Date..:**	03/28/99		
Prep Batch #...:	9067354	**Analysis Time..:**	07:16		
Dilution Factor:	1				
		Method.........:	SW846 8080A		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Aldrin	ND	38	ug/kg
alpha-BHC	ND	38	ug/kg
beta-BHC	ND	38	ug/kg
delta-BHC	ND	38	ug/kg
gamma-BHC (Lindane)	ND	38	ug/kg
Chlordane (technical)	ND	380	ug/kg
alpha-Chlordane	ND	38	ug/kg
gamma-Chlordane	ND	38	ug/kg
Chlorobenzilate	ND	740	ug/kg
4,4'-DDD	ND	74	ug/kg
4,4'-DDE	ND	74	ug/kg
4,4'-DDT	ND	74	ug/kg
Diallate	ND	740	ug/kg
Dieldrin	ND	74	ug/kg
Endosulfan I	ND	38	ug/kg
Endosulfan II	ND	74	ug/kg
Endosulfan sulfate	ND	74	ug/kg
Endrin	ND	74	ug/kg
Endrin aldehyde	ND	74	ug/kg
Endrin ketone	ND	74	ug/kg
Heptachlor	ND	38	ug/kg
Heptachlor epoxide	ND	38	ug/kg
Isodrin	ND	74	ug/kg
Kepone	ND	1900	ug/kg
Methoxychlor	ND	380	ug/kg
Aroclor 1016	ND	740	ug/kg
Aroclor 1221	ND	740	ug/kg
Aroclor 1232	ND	740	ug/kg
Aroclor 1242	ND	740	ug/kg
Aroclor 1248	ND	740	ug/kg
Aroclor 1254	ND	740	ug/kg
Aroclor 1260	ND	740	ug/kg
Toxaphene	ND	3800	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Decachlorobiphenyl	87	(62 - 139)
Tetrachloro-m-xylene	60	(46 - 117)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#12

GC Semivolatiles

Lot-Sample #...:	D9B240185-002	**Work Order #...:**	CR3DN103	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	03/08/99	**Analysis Date..:**	03/28/99		
Prep Batch #...:	9067354	**Analysis Time..:**	07:51		
Dilution Factor:	1				
		Method.........:	SW846 8080A		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Aldrin	ND	12	ug/kg
alpha-BHC	ND	12	ug/kg
beta-BHC	ND	12	ug/kg
delta-BHC	ND	12	ug/kg
gamma-BHC (Lindane)	ND	12	ug/kg
Chlordane (technical)	ND	120	ug/kg
alpha-Chlordane	ND	12	ug/kg
gamma-Chlordane	ND	12	ug/kg
Chlorobenzilate	ND	240	ug/kg
4,4'-DDD	**5.3 J**	**24**	**ug/kg**
4,4'-DDE	ND	24	ug/kg
4,4'-DDT	ND	24	ug/kg
Diallate	ND	240	ug/kg
Dieldrin	ND	24	ug/kg
Endosulfan I	ND	12	ug/kg
Endosulfan II	ND	24	ug/kg
Endosulfan sulfate	ND	24	ug/kg
Endrin	ND	24	ug/kg
Endrin aldehyde	ND	24	ug/kg
Endrin ketone	ND	24	ug/kg
Heptachlor	ND	12	ug/kg
Heptachlor epoxide	ND	12	ug/kg
Isodrin	ND	24	ug/kg
Kepone	ND	600	ug/kg
Methoxychlor	ND	120	ug/kg
Aroclor 1016	ND	240	ug/kg
Aroclor 1221	ND	240	ug/kg
Aroclor 1232	ND	240	ug/kg
Aroclor 1242	ND	240	ug/kg
Aroclor 1248	ND	240	ug/kg
Aroclor 1254	ND	240	ug/kg
Aroclor 1260	ND	240	ug/kg
Toxaphene	ND	1200	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Decachlorobiphenyl	90	(62 - 139)
Tetrachloro-m-xylene	75	(46 - 117)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#14

GC Semivolatiles

Lot-Sample #...:	D9B240185-003	**Work Order #...:**	CR3DV103	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	03/08/99	**Analysis Date..:**	03/28/99		
Prep Batch #...:	9067354	**Analysis Time..:**	08:25		
Dilution Factor:	1				
		Method.........:	SW846 8080A		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Aldrin	ND	9.6	ug/kg
alpha-BHC	ND	9.6	ug/kg
beta-BHC	ND	9.6	ug/kg
delta-BHC	ND	9.6	ug/kg
gamma-BHC (Lindane)	ND	9.6	ug/kg
Chlordane (technical)	ND	96	ug/kg
alpha-Chlordane	ND	9.6	ug/kg
gamma-Chlordane	ND	9.6	ug/kg
Chlorobenzilate	ND	190	ug/kg
4,4'-DDD	**3.3 J**	**19**	**ug/kg**
4,4'-DDE	ND	19	ug/kg
4,4'-DDT	ND	19	ug/kg
Diallate	ND	190	ug/kg
Dieldrin	ND	19	ug/kg
Endosulfan I	ND	9.6	ug/kg
Endosulfan II	ND	19	ug/kg
Endosulfan sulfate	ND	19	ug/kg
Endrin	ND	19	ug/kg
Endrin aldehyde	ND	19	ug/kg
Endrin ketone	ND	19	ug/kg
Heptachlor	ND	9.6	ug/kg
Heptachlor epoxide	ND	9.6	ug/kg
Isodrin	ND	19	ug/kg
Kepone	ND	470	ug/kg
Methoxychlor	ND	96	ug/kg
Aroclor 1016	ND	190	ug/kg
Aroclor 1221	ND	190	ug/kg
Aroclor 1232	ND	190	ug/kg
Aroclor 1242	ND	190	ug/kg
Aroclor 1248	ND	190	ug/kg
Aroclor 1254	ND	190	ug/kg
Aroclor 1260	ND	190	ug/kg
Toxaphene	ND	960	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Decachlorobiphenyl	85	(62 - 139)
Tetrachloro-m-xylene	71	(46 - 117)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#18

GC Semivolatiles

Lot-Sample #...: D9B240185-004 **Work Order #...:** CR3E1103 **Matrix.........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99
Prep Date......: 03/08/99 **Analysis Date..:** 03/28/99
Prep Batch #...: 9067354 **Analysis Time..:** 08:59
Dilution Factor: 1

Method.........: SW846 8080A

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Aldrin	ND	15	ug/kg
alpha-BHC	ND	15	ug/kg
beta-BHC	ND	15	ug/kg
delta-BHC	ND	15	ug/kg
gamma-BHC (Lindane)	ND	15	ug/kg
Chlordane (technical)	ND	150	ug/kg
alpha-Chlordane	ND	15	ug/kg
gamma-Chlordane	ND	15	ug/kg
Chlorobenzilate	ND	290	ug/kg
4,4'-DDD	ND	29	ug/kg
4,4'-DDE	ND	29	ug/kg
4,4'-DDT	ND	29	ug/kg
Diallate	ND	290	ug/kg
Dieldrin	ND	29	ug/kg
Endosulfan I	ND	15	ug/kg
Endosulfan II	ND	29	ug/kg
Endosulfan sulfate	ND	29	ug/kg
Endrin	ND	29	ug/kg
Endrin aldehyde	ND	29	ug/kg
Endrin ketone	ND	29	ug/kg
Heptachlor	ND	15	ug/kg
Heptachlor epoxide	ND	15	ug/kg
Isodrin	ND	29	ug/kg
Kepone	ND	740	ug/kg
Methoxychlor	ND	150	ug/kg
Aroclor 1016	ND	290	ug/kg
Aroclor 1221	ND	290	ug/kg
Aroclor 1232	ND	290	ug/kg
Aroclor 1242	ND	290	ug/kg
Aroclor 1248	ND	290	ug/kg
Aroclor 1254	ND	290	ug/kg
Aroclor 1260	ND	290	ug/kg
Toxaphene	ND	1500	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Decachlorobiphenyl	73	(62 - 139)
Tetrachloro-m-xylene	71	(46 - 117)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#22

GC Semivolatiles

Lot-Sample #...: D9B240185-005 **Work Order #...:** CR3E3103 **Matrix.........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99
Prep Date......: 03/08/99 **Analysis Date..:** 03/28/99
Prep Batch #...: 9067354 **Analysis Time..:** 09:33
Dilution Factor: 1

Method.........: SW846 8080A

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Aldrin	ND	5.9	ug/kg
alpha-BHC	ND	5.9	ug/kg
beta-BHC	ND	5.9	ug/kg
delta-BHC	ND	5.9	ug/kg
gamma-BHC (Lindane)	ND	5.9	ug/kg
Chlordane (technical)	ND	59	ug/kg
alpha-Chlordane	ND	5.9	ug/kg
gamma-Chlordane	ND	5.9	ug/kg
Chlorobenzilate	ND	110	ug/kg
4,4'-DDD	ND	11	ug/kg
4,4'-DDE	ND	11	ug/kg
4,4'-DDT	ND	11	ug/kg
Diallate	ND	110	ug/kg
Dieldrin	ND	11	ug/kg
Endosulfan I	ND	5.9	ug/kg
Endosulfan II	ND	11	ug/kg
Endosulfan sulfate	ND	11	ug/kg
Endrin	ND	11	ug/kg
Endrin aldehyde	ND	11	ug/kg
Endrin ketone	ND	11	ug/kg
Heptachlor	ND	5.9	ug/kg
Heptachlor epoxide	ND	5.9	ug/kg
Isodrin	ND	11	ug/kg
Kepone	ND	290	ug/kg
Methoxychlor	ND	59	ug/kg
Aroclor 1016	ND	110	ug/kg
Aroclor 1221	ND	110	ug/kg
Aroclor 1232	ND	110	ug/kg
Aroclor 1242	ND	110	ug/kg
Aroclor 1248	ND	110	ug/kg
Aroclor 1254	ND	110	ug/kg
Aroclor 1260	ND	110	ug/kg
Toxaphene	ND	590	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Decachlorobiphenyl	82	(62 - 139)
Tetrachloro-m-xylene	74	(46 - 117)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#26

GC Semivolatiles

Lot-Sample #...:	D9B240185-006	**Work Order #...:**	CR3E6103	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	03/08/99	**Analysis Date..:**	03/28/99		
Prep Batch #...:	9067354	**Analysis Time..:**	10:08		
Dilution Factor:	1				
		Method.........:	SW846 8080A		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Aldrin	ND	5.5	ug/kg
alpha-BHC	ND	5.5	ug/kg
beta-BHC	ND	5.5	ug/kg
delta-BHC	**3.8 J**	**5.5**	**ug/kg**
gamma-BHC (Lindane)	ND	5.5	ug/kg
Chlordane (technical)	ND	55	ug/kg
alpha-Chlordane	ND	5.5	ug/kg
gamma-Chlordane	ND	5.5	ug/kg
Chlorobenzilate	ND	110	ug/kg
4,4'-DDD	ND	11	ug/kg
4,4'-DDE	ND	11	ug/kg
4,4'-DDT	ND	11	ug/kg
Diallate	ND	110	ug/kg
Dieldrin	ND	11	ug/kg
Endosulfan I	ND	5.5	ug/kg
Endosulfan II	ND	11	ug/kg
Endosulfan sulfate	ND	11	ug/kg
Endrin	ND	11	ug/kg
Endrin aldehyde	ND	11	ug/kg
Endrin ketone	ND	11	ug/kg
Heptachlor	ND	5.5	ug/kg
Heptachlor epoxide	ND	5.5	ug/kg
Isodrin	ND	11	ug/kg
Kepone	ND	270	ug/kg
Methoxychlor	ND	55	ug/kg
Aroclor 1016	ND	110	ug/kg
Aroclor 1221	ND	110	ug/kg
Aroclor 1232	ND	110	ug/kg
Aroclor 1242	ND	110	ug/kg
Aroclor 1248	ND	110	ug/kg
Aroclor 1254	ND	110	ug/kg
Aroclor 1260	ND	110	ug/kg
Toxaphene	ND	550	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Decachlorobiphenyl	87	(62 - 139)
Tetrachloro-m-xylene	81	(46 - 117)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#27

GC Semivolatiles

Lot-Sample #...: D9B240185-007 **Work Order #...:** CR3E9103 **Matrix.........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99
Prep Date......: 03/08/99 **Analysis Date..:** 03/28/99
Prep Batch #...: 9067354 **Analysis Time..:** 10:42
Dilution Factor: 1

Method.........: SW846 8080A

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Aldrin	ND	4.9	ug/kg
alpha-BHC	ND	4.9	ug/kg
beta-BHC	ND	4.9	ug/kg
delta-BHC	ND	4.9	ug/kg
gamma-BHC (Lindane)	**1.5 J**	**4.9**	**ug/kg**
Chlordane (technical)	ND	49	ug/kg
alpha-Chlordane	ND	4.9	ug/kg
gamma-Chlordane	ND	4.9	ug/kg
Chlorobenzilate	ND	94	ug/kg
4,4'-DDD	ND	9.4	ug/kg
4,4'-DDE	ND	9.4	ug/kg
4,4'-DDT	ND	9.4	ug/kg
Diallate	ND	94	ug/kg
Dieldrin	ND	9.4	ug/kg
Endosulfan I	ND	4.9	ug/kg
Endosulfan II	ND	9.4	ug/kg
Endosulfan sulfate	ND	9.4	ug/kg
Endrin	ND	9.4	ug/kg
Endrin aldehyde	ND	9.4	ug/kg
Endrin ketone	ND	9.4	ug/kg
Heptachlor	ND	4.9	ug/kg
Heptachlor epoxide	ND	4.9	ug/kg
Isodrin	ND	9.4	ug/kg
Kepone	ND	240	ug/kg
Methoxychlor	ND	49	ug/kg
Aroclor 1016	ND	94	ug/kg
Aroclor 1221	ND	94	ug/kg
Aroclor 1232	ND	94	ug/kg
Aroclor 1242	ND	94	ug/kg
Aroclor 1248	ND	94	ug/kg
Aroclor 1254	ND	94	ug/kg
Aroclor 1260	ND	94	ug/kg
Toxaphene	ND	490	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Decachlorobiphenyl	88	(62 - 139)
Tetrachloro-m-xylene	80	(46 - 117)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#30

GC Semivolatiles

Lot-Sample #...:	D9B240185-008	**Work Order #...:**	CR3EP103	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	03/08/99	**Analysis Date..:**	03/28/99		
Prep Batch #...:	9067354	**Analysis Time..:**	12:24		
Dilution Factor:	1				
		Method.........:	SW846 8080A		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Aldrin	ND	7.2	ug/kg
alpha-BHC	ND	7.2	ug/kg
beta-BHC	ND	7.2	ug/kg
delta-BHC	ND	7.2	ug/kg
gamma-BHC (Lindane)	ND	7.2	ug/kg
Chlordane (technical)	ND	72	ug/kg
alpha-Chlordane	ND	7.2	ug/kg
gamma-Chlordane	ND	7.2	ug/kg
Chlorobenzilate	ND	140	ug/kg
4,4'-DDD	ND	14	ug/kg
4,4'-DDE	ND	14	ug/kg
4,4'-DDT	ND	14	ug/kg
Diallate	ND	140	ug/kg
Dieldrin	ND	14	ug/kg
Endosulfan I	ND	7.2	ug/kg
Endosulfan II	ND	14	ug/kg
Endosulfan sulfate	ND	14	ug/kg
Endrin	ND	14	ug/kg
Endrin aldehyde	ND	14	ug/kg
Endrin ketone	ND	14	ug/kg
Heptachlor	ND	7.2	ug/kg
Heptachlor epoxide	ND	7.2	ug/kg
Isodrin	ND	14	ug/kg
Kepone	ND	350	ug/kg
Methoxychlor	ND	72	ug/kg
Aroclor 1016	ND	140	ug/kg
Aroclor 1221	ND	140	ug/kg
Aroclor 1232	ND	140	ug/kg
Aroclor 1242	ND	140	ug/kg
Aroclor 1248	ND	140	ug/kg
Aroclor 1254	ND	140	ug/kg
Aroclor 1260	ND	140	ug/kg
Toxaphene	ND	720	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Decachlorobiphenyl	89	(62 - 139)
Tetrachloro-m-xylene	77	(46 - 117)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#60

GC Semivolatiles

Lot-Sample #...:	D9B240185-009	**Work Order #...:**	CR3EW103	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	03/08/99	**Analysis Date..:**	03/28/99		
Prep Batch #...:	9067354	**Analysis Time..:**	12:59		
Dilution Factor:	1				
		Method.........:	SW846 8080A		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Aldrin	ND	18	ug/kg
alpha-BHC	ND	18	ug/kg
beta-BHC	ND	18	ug/kg
delta-BHC	ND	18	ug/kg
gamma-BHC (Lindane)	ND	18	ug/kg
Chlordane (technical)	ND	180	ug/kg
alpha-Chlordane	ND	18	ug/kg
gamma-Chlordane	ND	18	ug/kg
Chlorobenzilate	ND	350	ug/kg
4,4'-DDD	ND	35	ug/kg
4,4'-DDE	ND	35	ug/kg
4,4'-DDT	ND	35	ug/kg
Diallate	ND	350	ug/kg
Dieldrin	ND	35	ug/kg
Endosulfan I	ND	18	ug/kg
Endosulfan II	ND	35	ug/kg
Endosulfan sulfate	ND	35	ug/kg
Endrin	ND	35	ug/kg
Endrin aldehyde	ND	35	ug/kg
Endrin ketone	ND	35	ug/kg
Heptachlor	ND	18	ug/kg
Heptachlor epoxide	ND	18	ug/kg
Isodrin	ND	35	ug/kg
Kepone	ND	870	ug/kg
Methoxychlor	ND	180	ug/kg
Aroclor 1016	ND	350	ug/kg
Aroclor 1221	ND	350	ug/kg
Aroclor 1232	ND	350	ug/kg
Aroclor 1242	ND	350	ug/kg
Aroclor 1248	ND	350	ug/kg
Aroclor 1254	ND	350	ug/kg
Aroclor 1260	ND	350	ug/kg
Toxaphene	ND	1800	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Decachlorobiphenyl	69	(62 - 139)
Tetrachloro-m-xylene	69	(46 - 117)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#33

GC Semivolatiles

Lot-Sample #...:	D9B240185-010	**Work Order #...:**	CR3F5103	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	03/08/99	**Analysis Date..:**	03/28/99		
Prep Batch #...:	9067354	**Analysis Time..:**	13:33		
Dilution Factor:	1				
		Method.........:	SW846 8080A		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Aldrin	ND	4.4	ug/kg
alpha-BHC	ND	4.4	ug/kg
beta-BHC	ND	4.4	ug/kg
delta-BHC	ND	4.4	ug/kg
gamma-BHC (Lindane)	ND	4.4	ug/kg
Chlordane (technical)	ND	44	ug/kg
alpha-Chlordane	ND	4.4	ug/kg
gamma-Chlordane	ND	4.4	ug/kg
Chlorobenzilate	ND	86	ug/kg
4,4'-DDD	ND	8.6	ug/kg
4,4'-DDE	ND	8.6	ug/kg
4,4'-DDT	ND	8.6	ug/kg
Diallate	ND	86	ug/kg
Dieldrin	ND	8.6	ug/kg
Endosulfan I	ND	4.4	ug/kg
Endosulfan II	ND	8.6	ug/kg
Endosulfan sulfate	ND	8.6	ug/kg
Endrin	ND	8.6	ug/kg
Endrin aldehyde	ND	8.6	ug/kg
Endrin ketone	ND	8.6	ug/kg
Heptachlor	ND	4.4	ug/kg
Heptachlor epoxide	ND	4.4	ug/kg
Isodrin	ND	8.6	ug/kg
Kepone	ND	220	ug/kg
Methoxychlor	ND	44	ug/kg
Aroclor 1016	ND	86	ug/kg
Aroclor 1221	ND	86	ug/kg
Aroclor 1232	ND	86	ug/kg
Aroclor 1242	ND	86	ug/kg
Aroclor 1248	ND	86	ug/kg
Aroclor 1254	ND	86	ug/kg
Aroclor 1260	ND	86	ug/kg
Toxaphene	ND	440	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Decachlorobiphenyl	85	(62 - 139)
Tetrachloro-m-xylene	78	(46 - 117)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#4

GC Semivolatiles

Lot-Sample #...: D9B240185-001 **Work Order #...:** CR3CF10H **Matrix.........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99
Prep Date......: 03/08/99 **Analysis Date..:** 03/10/99
Prep Batch #...: 9067270 **Analysis Time..:** 06:47
Dilution Factor: 1

Method.........: SW846 8140

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Azinphos-methyl	ND	1900	ug/kg
Bolstar	ND	380	ug/kg
Chlorpyrifos	ND	380	ug/kg
Coumaphos	ND	380	ug/kg
Demeton (total)	ND	380	ug/kg
Diazinon	ND	380	ug/kg
Dichlorvos	ND	380	ug/kg
Dimethoate	ND	380	ug/kg
Disulfoton	ND	380	ug/kg
Ethoprop	ND	380	ug/kg
Ethyl parathion	ND	380	ug/kg
Fensulfothion	ND	1900	ug/kg
Fenthion	ND	380	ug/kg
Malathion	ND	940	ug/kg
Merphos	ND	380	ug/kg
Methyl parathion	ND	380	ug/kg
Mevinphos	ND	4700	ug/kg
Naled	ND	7400	ug/kg
Phorate	ND	380	ug/kg
Ronnel	ND	380	ug/kg
Sulfotepp	ND	380	ug/kg
Tokuthion	ND	380	ug/kg
Trichloronate	ND	380	ug/kg
Tetrachlorvinphos (Stirophos)	ND	1900	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Ethyl Pirimifos	80	(55 - 105)
Chlormefos	74	(50 - 150)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#12

GC Semivolatiles

Lot-Sample #...: D9B240185-002 **Work Order #...:** CR3DN10F **Matrix.........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99
Prep Date......: 03/08/99 **Analysis Date..:** 03/10/99
Prep Batch #...: 9067270 **Analysis Time..:** 07:19
Dilution Factor: 1

Method.........: SW846 8140

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Azinphos-methyl	ND	600	ug/kg
Bolstar	ND	120	ug/kg
Chlorpyrifos	ND	120	ug/kg
Coumaphos	ND	120	ug/kg
Demeton (total)	ND	120	ug/kg
Diazinon	ND	120	ug/kg
Dichlorvos	ND	120	ug/kg
Dimethoate	ND	120	ug/kg
Disulfoton	ND	120	ug/kg
Ethoprop	ND	120	ug/kg
Ethyl parathion	ND	120	ug/kg
Fensulfothion	ND	600	ug/kg
Fenthion	ND	120	ug/kg
Malathion	ND	300	ug/kg
Merphos	ND	120	ug/kg
Methyl parathion	ND	120	ug/kg
Mevinphos	ND	1500	ug/kg
Naled	ND	2400	ug/kg
Phorate	ND	120	ug/kg
Ronnel	ND	120	ug/kg
Sulfotepp	ND	120	ug/kg
Tokuthion	ND	120	ug/kg
Trichloronate	ND	120	ug/kg
Tetrachlorvinphos (Stirophos)	ND	600	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Ethyl Pirimifos	85	(55 - 105)
Chlormefos	77	(50 - 150)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#14

GC Semivolatiles

Lot-Sample #...:	D9B240185-003	**Work Order #...:**	CR3DV10F	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	03/08/99	**Analysis Date..:**	03/10/99		
Prep Batch #...:	9067270	**Analysis Time..:**	07:52		
Dilution Factor:	1				
		Method.........:	SW846 8140		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Azinphos-methyl	ND	470	ug/kg
Bolstar	ND	96	ug/kg
Chlorpyrifos	ND	96	ug/kg
Coumaphos	ND	96	ug/kg
Demeton (total)	ND	96	ug/kg
Diazinon	ND	96	ug/kg
Dichlorvos	ND	96	ug/kg
Dimethoate	ND	96	ug/kg
Disulfoton	ND	96	ug/kg
Ethoprop	ND	96	ug/kg
Ethyl parathion	ND	96	ug/kg
Fensulfothion	ND	470	ug/kg
Fenthion	ND	96	ug/kg
Malathion	ND	240	ug/kg
Merphos	ND	96	ug/kg
Methyl parathion	ND	96	ug/kg
Mevinphos	ND	1200	ug/kg
Naled	ND	1900	ug/kg
Phorate	ND	96	ug/kg
Ronnel	ND	96	ug/kg
Sulfotepp	ND	96	ug/kg
Tokuthion	ND	96	ug/kg
Trichloronate	ND	96	ug/kg
Tetrachlorvinphos (Stirophos)	ND	470	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Ethyl Pirimifos	86	(55 - 105)
Chlormefos	76	(50 - 150)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#18

GC Semivolatiles

Lot-Sample #...:	D9B240185-004	**Work Order #...:**	CR3E110F	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	03/08/99	**Analysis Date..:**	03/10/99		
Prep Batch #...:	9067270	**Analysis Time..:**	08:25		
Dilution Factor:	1				
		Method.........:	SW846 8140		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Azinphos-methyl	ND	740	ug/kg
Bolstar	ND	150	ug/kg
Chlorpyrifos	ND	150	ug/kg
Coumaphos	ND	150	ug/kg
Demeton (total)	ND	150	ug/kg
Diazinon	ND	150	ug/kg
Dichlorvos	ND	150	ug/kg
Dimethoate	ND	150	ug/kg
Disulfoton	ND	150	ug/kg
Ethoprop	ND	150	ug/kg
Ethyl parathion	ND	150	ug/kg
Fensulfothion	ND	740	ug/kg
Fenthion	ND	150	ug/kg
Malathion	ND	380	ug/kg
Merphos	ND	150	ug/kg
Methyl parathion	ND	150	ug/kg
Mevinphos	ND	1900	ug/kg
Naled	ND	2900	ug/kg
Phorate	ND	150	ug/kg
Ronnel	ND	150	ug/kg
Sulfotepp	ND	150	ug/kg
Tokuthion	ND	150	ug/kg
Trichloronate	ND	150	ug/kg
Tetrachlorvinphos (Stirophos)	ND	740	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Ethyl Pirimifos	88	(55 - 105)
Chlormefos	78	(50 - 150)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#22

GC Semivolatiles

Lot-Sample #...:	D9B240185-005	**Work Order #...:**	CR3E310F	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	03/08/99	**Analysis Date..:**	03/10/99		
Prep Batch #...:	9067270	**Analysis Time..:**	08:58		
Dilution Factor:	1				
		Method.........:	SW846 8140		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Azinphos-methyl	ND	290	ug/kg
Bolstar	ND	59	ug/kg
Chlorpyrifos	ND	59	ug/kg
Coumaphos	ND	59	ug/kg
Demeton (total)	ND	59	ug/kg
Diazinon	ND	59	ug/kg
Dichlorvos	ND	59	ug/kg
Dimethoate	ND	59	ug/kg
Disulfoton	ND	59	ug/kg
Ethoprop	ND	59	ug/kg
Ethyl parathion	ND	59	ug/kg
Fensulfothion	ND	290	ug/kg
Fenthion	ND	59	ug/kg
Malathion	ND	150	ug/kg
Merphos	ND	59	ug/kg
Methyl parathion	ND	59	ug/kg
Mevinphos	ND	730	ug/kg
Naled	ND	1100	ug/kg
Phorate	ND	59	ug/kg
Ronnel	ND	59	ug/kg
Sulfotepp	ND	59	ug/kg
Tokuthion	ND	59	ug/kg
Trichloronate	ND	59	ug/kg
Tetrachlorvinphos (Stirophos)	ND	290	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Ethyl Pirimifos	59	(55 - 105)
Chlormefos	79	(50 - 150)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#26

GC Semivolatiles

Lot-Sample #...:	D9B240185-006	**Work Order #...:**	CR3E610F	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	03/08/99	**Analysis Date..:**	03/10/99		
Prep Batch #...:	9067270	**Analysis Time..:**	11:42		
Dilution Factor:	1				
		Method.........:	SW846 8140		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Azinphos-methyl	ND	270	ug/kg
Bolstar	ND	55	ug/kg
Chlorpyrifos	ND	55	ug/kg
Coumaphos	ND	55	ug/kg
Demeton (total)	ND	55	ug/kg
Diazinon	ND	55	ug/kg
Dichlorvos	ND	55	ug/kg
Dimethoate	ND	55	ug/kg
Disulfoton	ND	55	ug/kg
Ethoprop	ND	55	ug/kg
Ethyl parathion	ND	55	ug/kg
Fensulfothion	ND	270	ug/kg
Fenthion	ND	55	ug/kg
Malathion	ND	140	ug/kg
Merphos	ND	55	ug/kg
Methyl parathion	ND	55	ug/kg
Mevinphos	ND	680	ug/kg
Naled	ND	1100	ug/kg
Phorate	ND	55	ug/kg
Ronnel	ND	55	ug/kg
Sulfotepp	ND	55	ug/kg
Tokuthion	ND	55	ug/kg
Trichloronate	ND	55	ug/kg
Tetrachlorvinphos (Stirophos)	ND	270	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Ethyl Pirimifos	85	(55 - 105)
Chlormefos	77	(50 - 150)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#27

GC Semivolatiles

Lot-Sample #...: D9B240185-007 **Work Order #...:** CR3E910F **Matrix.........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99
Prep Date......: 03/08/99 **Analysis Date..:** 03/10/99
Prep Batch #...: 9067270 **Analysis Time..:** 12:15
Dilution Factor: 1

Method.........: SW846 8140

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Azinphos-methyl	ND	240	ug/kg
Bolstar	ND	49	ug/kg
Chlorpyrifos	ND	49	ug/kg
Coumaphos	ND	49	ug/kg
Demeton (total)	ND	49	ug/kg
Diazinon	ND	49	ug/kg
Dichlorvos	ND	49	ug/kg
Dimethoate	ND	49	ug/kg
Disulfoton	ND	49	ug/kg
Ethoprop	ND	49	ug/kg
Ethyl parathion	ND	49	ug/kg
Fensulfothion	ND	240	ug/kg
Fenthion	ND	49	ug/kg
Malathion	ND	120	ug/kg
Merphos	ND	49	ug/kg
Methyl parathion	ND	49	ug/kg
Mevinphos	ND	600	ug/kg
Naled	ND	940	ug/kg
Phorate	ND	49	ug/kg
Ronnel	ND	49	ug/kg
Sulfotepp	ND	49	ug/kg
Tokuthion	ND	49	ug/kg
Trichloronate	ND	49	ug/kg
Tetrachlorvinphos (Stirophos)	ND	240	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Ethyl Pirimifos	85	(55 - 105)
Chlormefos	75	(50 - 150)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#30

GC Semivolatiles

Lot-Sample #...:	D9B240185-008	**Work Order #...:**	CR3EP10F	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	03/08/99	**Analysis Date..:**	03/10/99		
Prep Batch #...:	9067270	**Analysis Time..:**	12:48		
Dilution Factor:	1				
		Method.........:	SW846 8140		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Azinphos-methyl	ND	350	ug/kg
Bolstar	ND	72	ug/kg
Chlorpyrifos	ND	72	ug/kg
Coumaphos	ND	72	ug/kg
Demeton (total)	ND	72	ug/kg
Diazinon	ND	72	ug/kg
Dichlorvos	ND	72	ug/kg
Dimethoate	ND	72	ug/kg
Disulfoton	ND	72	ug/kg
Ethoprop	ND	72	ug/kg
Ethyl parathion	ND	72	ug/kg
Fensulfothion	ND	350	ug/kg
Fenthion	ND	72	ug/kg
Malathion	ND	180	ug/kg
Merphos	ND	72	ug/kg
Methyl parathion	ND	72	ug/kg
Mevinphos	ND	890	ug/kg
Naled	ND	1400	ug/kg
Phorate	ND	72	ug/kg
Ronnel	ND	72	ug/kg
Sulfotepp	ND	72	ug/kg
Tokuthion	ND	72	ug/kg
Trichloronate	ND	72	ug/kg
Tetrachlorvinphos (Stirophos)	ND	350	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Ethyl Pirimifos	85	(55 - 105)
Chlormefos	77	(50 - 150)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#60

GC Semivolatiles

Lot-Sample #...:	D9B240185-009	**Work Order #...:**	CR3EW10F	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	03/08/99	**Analysis Date..:**	03/10/99		
Prep Batch #...:	9067270	**Analysis Time..:**	13:20		
Dilution Factor:	1				
		Method.........:	SW846 8140		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Azinphos-methyl	ND	870	ug/kg
Bolstar	ND	180	ug/kg
Chlorpyrifos	ND	180	ug/kg
Coumaphos	ND	180	ug/kg
Demeton (total)	ND	180	ug/kg
Diazinon	ND	180	ug/kg
Dichlorvos	ND	180	ug/kg
Dimethoate	ND	180	ug/kg
Disulfoton	ND	180	ug/kg
Ethoprop	ND	180	ug/kg
Ethyl parathion	ND	180	ug/kg
Fensulfothion	ND	870	ug/kg
Fenthion	ND	180	ug/kg
Malathion	ND	440	ug/kg
Merphos	ND	180	ug/kg
Methyl parathion	ND	180	ug/kg
Mevinphos	ND	2200	ug/kg
Naled	ND	3500	ug/kg
Phorate	ND	180	ug/kg
Ronnel	ND	180	ug/kg
Sulfotepp	ND	180	ug/kg
Tokuthion	ND	180	ug/kg
Trichloronate	ND	180	ug/kg
Tetrachlorvinphos (Stirophos)	ND	870	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Ethyl Pirimifos	83	(55 - 105)
Chlormefos	75	(50 - 150)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#33

GC Semivolatiles

Lot-Sample #...:	D9B240185-010	**Work Order #...:**	CR3F510F	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	03/08/99	**Analysis Date..:**	03/10/99		
Prep Batch #...:	9067270	**Analysis Time..:**	13:53		
Dilution Factor:	1				
		Method.........:	SW846 8140		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Azinphos-methyl	ND	220	ug/kg
Bolstar	ND	44	ug/kg
Chlorpyrifos	ND	44	ug/kg
Coumaphos	ND	44	ug/kg
Demeton (total)	ND	44	ug/kg
Diazinon	ND	44	ug/kg
Dichlorvos	ND	44	ug/kg
Dimethoate	ND	44	ug/kg
Disulfoton	ND	44	ug/kg
Ethoprop	ND	44	ug/kg
Ethyl parathion	ND	44	ug/kg
Fensulfothion	ND	220	ug/kg
Fenthion	ND	44	ug/kg
Malathion	ND	110	ug/kg
Merphos	ND	44	ug/kg
Methyl parathion	ND	44	ug/kg
Mevinphos	ND	550	ug/kg
Naled	ND	860	ug/kg
Phorate	ND	44	ug/kg
Ronnel	ND	44	ug/kg
Sulfotepp	ND	44	ug/kg
Tokuthion	ND	44	ug/kg
Trichloronate	ND	44	ug/kg
Tetrachlorvinphos (Stirophos)	ND	220	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Ethyl Pirimifos	83	(55 - 105)
Chlormefos	78	(50 - 150)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#4

HPLC

Lot-Sample #...: D9B240185-001 **Work Order #...:** CR3CF102 **Matrix.........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99
Prep Date......: 02/25/99 **Analysis Date..:** 03/12/99
Prep Batch #...: 9056304 **Analysis Time..:** 14:51
Dilution Factor: 2

Method.........: SW846 8310

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Acenaphthene	ND	8900	ug/kg
Acenaphthylene	ND	8900	ug/kg
Anthracene	**130 J**	**890**	**ug/kg**
Benzo(a)anthracene	**150 J**	**890**	**ug/kg**
Benzo(a)pyrene	ND	890	ug/kg
Benzo(b)fluoranthene	**840 J**	**890**	**ug/kg**
Benzo(ghi)perylene	**110 J**	**1800**	**ug/kg**
Benzo(k)fluoranthene	**270 J**	**890**	**ug/kg**
Chrysene	ND	1800	ug/kg
Dibenzo(a,h)anthracene	ND	1800	ug/kg
Fluoranthene	**1100 J**	**1800**	**ug/kg**
Fluorene	ND	1800	ug/kg
Indeno(1,2,3-cd)pyrene	ND	1800	ug/kg
1-Methylnaphthalene	ND	8900	ug/kg
2-Methylnaphthalene	ND	8900	ug/kg
Naphthalene	ND	8900	ug/kg
Phenanthrene	ND	1800	ug/kg
Pyrene	ND	1800	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	67	(57 - 140)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#12

HPLC

Lot-Sample #...: D9B240185-002
Work Order #...: CR3DN102
Matrix.........: SOLID
Date Sampled...: 02/22/99
Date Received..: 02/24/99
Prep Date......: 02/25/99
Analysis Date..: 03/12/99
Prep Batch #...: 9056304
Analysis Time..: 16:21
Dilution Factor: 2

Method.........: SW846 8310

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Acenaphthene	ND	2900	ug/kg
Acenaphthylene	ND	2900	ug/kg
Anthracene	ND	290	ug/kg
Benzo(a)anthracene	ND	290	ug/kg
Benzo(a)pyrene	**120 J**	**290**	**ug/kg**
Benzo(b)fluoranthene	**240 J**	**290**	**ug/kg**
Benzo(ghi)perylene	ND	570	ug/kg
Benzo(k)fluoranthene	ND	290	ug/kg
Chrysene	ND	570	ug/kg
Dibenzo(a,h)anthracene	ND	570	ug/kg
Fluoranthene	**230 J**	**570**	**ug/kg**
Fluorene	ND	570	ug/kg
Indeno(1,2,3-cd)pyrene	ND	570	ug/kg
1-Methylnaphthalene	ND	2900	ug/kg
2-Methylnaphthalene	ND	2900	ug/kg
Naphthalene	ND	2900	ug/kg
Phenanthrene	ND	570	ug/kg
Pyrene	ND	570	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	61	(57 - 140)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#14

HPLC

Lot-Sample #...:	D9B240185-003	**Work Order #...:**	CR3DV102	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	02/25/99	**Analysis Date..:**	03/12/99		
Prep Batch #...:	9056304	**Analysis Time..:**	16:50		
Dilution Factor:	2				
		Method.........:	SW846 8310		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Acenaphthene	ND	2300	ug/kg
Acenaphthylene	ND	2300	ug/kg
Anthracene	ND	230	ug/kg
Benzo(a)anthracene	**60 J**	**230**	**ug/kg**
Benzo(a)pyrene	**120 J**	**230**	**ug/kg**
Benzo(b)fluoranthene	**270**	**230**	**ug/kg**
Benzo(ghi)perylene	ND	450	ug/kg
Benzo(k)fluoranthene	ND	230	ug/kg
Chrysene	ND	450	ug/kg
Dibenzo(a,h)anthracene	ND	450	ug/kg
Fluoranthene	**210 J**	**450**	**ug/kg**
Fluorene	ND	450	ug/kg
Indeno(1,2,3-cd)pyrene	ND	450	ug/kg
1-Methylnaphthalene	ND	2300	ug/kg
2-Methylnaphthalene	ND	2300	ug/kg
Naphthalene	ND	2300	ug/kg
Phenanthrene	ND	450	ug/kg
Pyrene	ND	450	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	72	(57 - 140)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#18

HPLC

Lot-Sample #...:	D9B240185-004	**Work Order #...:**	CR3E1102	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	02/25/99	**Analysis Date..:**	03/05/99		
Prep Batch #...:	9056304	**Analysis Time..:**	08:34		
Dilution Factor:	1				
		Method.........:	SW846 8310		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Acenaphthene	ND	1800	ug/kg
Acenaphthylene	ND	1800	ug/kg
Anthracene	**95 J**	**180**	**ug/kg**
Benzo(a)anthracene	**940**	**180**	**ug/kg**
Benzo(a)pyrene	ND	180	ug/kg
Benzo(b)fluoranthene	ND	180	ug/kg
Benzo(ghi)perylene	ND	360	ug/kg
Benzo(k)fluoranthene	ND	180	ug/kg
Chrysene	ND	360	ug/kg
Dibenzo(a,h)anthracene	ND	360	ug/kg
Fluoranthene	**4100**	**360**	**ug/kg**
Fluorene	ND	360	ug/kg
Indeno(1,2,3-cd)pyrene	ND	360	ug/kg
1-Methylnaphthalene	ND	1800	ug/kg
2-Methylnaphthalene	ND	1800	ug/kg
Naphthalene	ND	1800	ug/kg
Phenanthrene	**730**	**360**	**ug/kg**
Pyrene	**1700**	**360**	**ug/kg**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	73	(57 - 140)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#22

HPLC

Lot-Sample #...: D9B240185-005 **Work Order #...:** CR3E3102 **Matrix.........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99
Prep Date......: 02/25/99 **Analysis Date..:** 03/12/99
Prep Batch #...: 9056304 **Analysis Time..:** 17:20
Dilution Factor: 2

Method.........: SW846 8310

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Acenaphthene	ND	1400	ug/kg
Acenaphthylene	ND	1400	ug/kg
Anthracene	ND	140	ug/kg
Benzo(a)anthracene	ND	140	ug/kg
Benzo(a)pyrene	**58 J**	**140**	**ug/kg**
Benzo(b)fluoranthene	**91 J**	**140**	**ug/kg**
Benzo(ghi)perylene	ND	280	ug/kg
Benzo(k)fluoranthene	ND	140	ug/kg
Chrysene	ND	280	ug/kg
Dibenzo(a,h)anthracene	ND	280	ug/kg
Fluoranthene	**78 J**	**280**	**ug/kg**
Fluorene	ND	280	ug/kg
Indeno(1,2,3-cd)pyrene	ND	280	ug/kg
1-Methylnaphthalene	ND	1400	ug/kg
2-Methylnaphthalene	ND	1400	ug/kg
Naphthalene	ND	1400	ug/kg
Phenanthrene	ND	280	ug/kg
Pyrene	ND	280	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	66	(57 - 140)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#26

HPLC

Lot-Sample #...:	D9B240185-006	**Work Order #...:**	CR3E6102	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	02/25/99	**Analysis Date..:**	03/05/99		
Prep Batch #...:	9056304	**Analysis Time..:**	10:03		
Dilution Factor:	1				
		Method.........:	SW846 8310		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Acenaphthene	ND	650	ug/kg
Acenaphthylene	ND	650	ug/kg
Anthracene	ND	65	ug/kg
Benzo(a)anthracene	ND	65	ug/kg
Benzo(a)pyrene	**78**	**65**	**ug/kg**
Benzo(b)fluoranthene	ND	65	ug/kg
Benzo(ghi)perylene	**71 J**	**130**	**ug/kg**
Benzo(k)fluoranthene	**40 J**	**65**	**ug/kg**
Chrysene	ND	130	ug/kg
Dibenzo(a,h)anthracene	ND	130	ug/kg
Fluoranthene	**110 J**	**130**	**ug/kg**
Fluorene	ND	130	ug/kg
Indeno(1,2,3-cd)pyrene	ND	130	ug/kg
1-Methylnaphthalene	ND	650	ug/kg
2-Methylnaphthalene	ND	650	ug/kg
Naphthalene	ND	650	ug/kg
Phenanthrene	ND	130	ug/kg
Pyrene	ND	130	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	58	(57 - 140)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#27

HPLC

Lot-Sample #...:	D9B240185-007	**Work Order #...:**	CR3E9102	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	02/25/99	**Analysis Date..:**	03/05/99		
Prep Batch #...:	9056304	**Analysis Time..:**	10:33		
Dilution Factor:	1				
		Method.........:	SW846 8310		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Acenaphthene	ND	570	ug/kg
Acenaphthylene	ND	570	ug/kg
Anthracene	ND	57	ug/kg
Benzo(a)anthracene	ND	57	ug/kg
Benzo(a)pyrene	ND	57	ug/kg
Benzo(b)fluoranthene	ND	57	ug/kg
Benzo(ghi)perylene	ND	110	ug/kg
Benzo(k)fluoranthene	**21 J**	**57**	**ug/kg**
Chrysene	ND	110	ug/kg
Dibenzo(a,h)anthracene	ND	110	ug/kg
Fluoranthene	**58 J**	**110**	**ug/kg**
Fluorene	**130**	**110**	**ug/kg**
Indeno(1,2,3-cd)pyrene	ND	110	ug/kg
1-Methylnaphthalene	ND	570	ug/kg
2-Methylnaphthalene	ND	570	ug/kg
Naphthalene	ND	570	ug/kg
Phenanthrene	ND	110	ug/kg
Pyrene	**57 J**	**110**	**ug/kg**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	57	(57 - 140)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#30

HPLC

Lot-Sample #...:	D9B240185-008	**Work Order #...:**	CR3EP102	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	02/25/99	**Analysis Date..:**	03/12/99		
Prep Batch #...:	9056304	**Analysis Time..:**	17:50		
Dilution Factor:	2				
		Method.........:	SW846 8310		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Acenaphthene	ND	1700	ug/kg
Acenaphthylene	ND	1700	ug/kg
Anthracene	ND	170	ug/kg
Benzo(a)anthracene	ND	170	ug/kg
Benzo(a)pyrene	ND	170	ug/kg
Benzo(b)fluoranthene	ND	170	ug/kg
Benzo(ghi)perylene	ND	340	ug/kg
Benzo(k)fluoranthene	ND	170	ug/kg
Chrysene	ND	340	ug/kg
Dibenzo(a,h)anthracene	ND	340	ug/kg
Fluoranthene	ND	340	ug/kg
Fluorene	ND	340	ug/kg
Indeno(1,2,3-cd)pyrene	ND	340	ug/kg
1-Methylnaphthalene	ND	1700	ug/kg
2-Methylnaphthalene	ND	1700	ug/kg
Naphthalene	ND	1700	ug/kg
Phenanthrene	ND	340	ug/kg
Pyrene	ND	340	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	63	(57 - 140)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#60

HPLC

Lot-Sample #...:	D9B240185-009	**Work Order #...:**	CR3EW102	**Matrix..........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	02/25/99	**Analysis Date..:**	03/12/99		
Prep Batch #...:	9056304	**Analysis Time..:**	18:20		
Dilution Factor:	2				
		Method.........:	SW846 8310		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Acenaphthene	ND	4200	ug/kg
Acenaphthylene	ND	4200	ug/kg
Anthracene	ND	420	ug/kg
Benzo(a)anthracene	ND	420	ug/kg
Benzo(a)pyrene	**120 J**	**420**	**ug/kg**
Benzo(b)fluoranthene	**190 J**	**420**	**ug/kg**
Benzo(ghi)perylene	ND	840	ug/kg
Benzo(k)fluoranthene	ND	420	ug/kg
Chrysene	ND	840	ug/kg
Dibenzo(a,h)anthracene	ND	840	ug/kg
Fluoranthene	ND	840	ug/kg
Fluorene	ND	840	ug/kg
Indeno(1,2,3-cd)pyrene	ND	840	ug/kg
1-Methylnaphthalene	ND	4200	ug/kg
2-Methylnaphthalene	ND	4200	ug/kg
Naphthalene	ND	4200	ug/kg
Phenanthrene	ND	840	ug/kg
Pyrene	ND	840	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	62	(57 - 140)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

J Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#33

HPLC

Lot-Sample #...:	D9B240185-010	**Work Order #...:**	CR3F5102	**Matrix.........:**	SOLID
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	02/25/99	**Analysis Date..:**	03/12/99		
Prep Batch #...:	9056304	**Analysis Time..:**	18:50		
Dilution Factor:	2				
		Method.........:	SW846 8310		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Acenaphthene	ND	1000	ug/kg
Acenaphthylene	ND	1000	ug/kg
Anthracene	ND	100	ug/kg
Benzo(a)anthracene	ND	100	ug/kg
Benzo(a)pyrene	ND	100	ug/kg
Benzo(b)fluoranthene	ND	100	ug/kg
Benzo(ghi)perylene	ND	210	ug/kg
Benzo(k)fluoranthene	ND	100	ug/kg
Chrysene	ND	210	ug/kg
Dibenzo(a,h)anthracene	ND	210	ug/kg
Fluoranthene	ND	210	ug/kg
Fluorene	ND	210	ug/kg
Indeno(1,2,3-cd)pyrene	ND	210	ug/kg
1-Methylnaphthalene	ND	1000	ug/kg
2-Methylnaphthalene	ND	1000	ug/kg
Naphthalene	ND	1000	ug/kg
Phenanthrene	ND	210	ug/kg
Pyrene	ND	210	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	68	(57 - 140)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#4

TOTAL Metals

Lot-Sample #...: D9B240185-001 **Matrix.......:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9056141						
Mercury	ND	0.74	mg/kg	SW846 7471A	02/25-02/26/99	CR3CF10E
		Dilution Factor: 1		Analysis Time..: 11:21		
Prep Batch #...: 9056181						
Aluminum	**33900**	**223**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3CF105**
		Dilution Factor: 1		Analysis Time..: 19:06		
Arsenic	ND	223	mg/kg	SW846 6010B	02/26/99	CR3CF106
		Dilution Factor: 1		Analysis Time..: 19:06		
Cadmium	ND	11.2	mg/kg	SW846 6010B	02/26/99	CR3CF107
		Dilution Factor: 1		Analysis Time..: 19:06		
Chromium	**110**	**22.3**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3CF108**
		Dilution Factor: 1		Analysis Time..: 19:06		
Copper	**123**	**44.6**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3CF109**
		Dilution Factor: 1		Analysis Time..: 19:06		
Iron	**78800**	**223**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3CF10A**
		Dilution Factor: 1		Analysis Time..: 20:55		
Lead	**61.4 B**	**112**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3CF10C**
		Dilution Factor: 1		Analysis Time..: 19:06		
Zinc	**290**	**44.6**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3CF10D**
		Dilution Factor: 1		Analysis Time..: 19:06		

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#12

TOTAL Metals

Lot-Sample #...: D9B240185-002 Matrix.......: SOLID
Date Sampled...: 02/22/99 Date Received..: 02/24/99

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9056141						
Mercury	ND	0.24	mg/kg	SW846 7471A	02/25-02/26/99	CR3DN10E
		Dilution Factor: 1		Analysis Time..: 11:23		
Prep Batch #...: 9056181						
Aluminum	**10000**	**71.8**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3DN105**
		Dilution Factor: 1		Analysis Time..: 19:11		
Arsenic	ND	71.8	mg/kg	SW846 6010B	02/26/99	CR3DN106
		Dilution Factor: 1		Analysis Time..: 19:11		
Cadmium	ND	3.6	mg/kg	SW846 6010B	02/26/99	CR3DN107
		Dilution Factor: 1		Analysis Time..: 19:11		
Chromium	**42.0**	**7.2**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3DN108**
		Dilution Factor: 1		Analysis Time..: 19:11		
Copper	**34.5**	**14.4**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3DN109**
		Dilution Factor: 1		Analysis Time..: 19:11		
Iron	**22400**	**71.8**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3DN10A**
		Dilution Factor: 1		Analysis Time..: 21:00		
Lead	**24.0 B**	**35.9**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3DN10C**
		Dilution Factor: 1		Analysis Time..: 19:11		
Zinc	**110**	**14.4**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3DN10D**
		Dilution Factor: 1		Analysis Time..: 19:11		

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#14

TOTAL Metals

Lot-Sample #...: D9B240185-003 Matrix.......: SOLID
Date Sampled...: 02/22/99 Date Received..: 02/24/99

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9056141						
Mercury	**0.21**	**0.19**	**mg/kg**	**SW846 7471A**	**02/25-02/26/99**	**CR3DV10E**
		Dilution Factor: 1		Analysis Time..: 11:25		
Prep Batch #...: 9056181						
Aluminum	**9960**	**56.6**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3DV105**
		Dilution Factor: 1		Analysis Time..: 19:15		
Arsenic	ND	56.6	mg/kg	SW846 6010B	02/26/99	CR3DV106
		Dilution Factor: 1		Analysis Time..: 19:15		
Cadmium	ND	2.8	mg/kg	SW846 6010B	02/26/99	CR3DV107
		Dilution Factor: 1		Analysis Time..: 19:15		
Chromium	**42.1**	**5.7**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3DV108**
		Dilution Factor: 1		Analysis Time..: 19:15		
Copper	**35.1**	**11.3**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3DV109**
		Dilution Factor: 1		Analysis Time..: 19:15		
Iron	**24400**	**56.6**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3DV10A**
		Dilution Factor: 1		Analysis Time..: 21:04		
Lead	**24.3 B**	**28.3**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3DV10C**
		Dilution Factor: 1		Analysis Time..: 19:15		
Zinc	**119**	**11.3**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3DV10D**
		Dilution Factor: 1		Analysis Time..: 19:15		

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#18

TOTAL Metals

Lot-Sample #...: D9B240185-004 Matrix.......: SOLID
Date Sampled...: 02/22/99 Date Received..: 02/24/99

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9056141						
Mercury	ND	0.29	mg/kg	SW846 7471A	02/25-02/26/99	CR3E110E
		Dilution Factor: 1		Analysis Time..: 11:28		
Prep Batch #...: 9056181						
Aluminum	**15200**	**89.3**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E1105**
		Dilution Factor: 1		Analysis Time..: 19:30		
Arsenic	ND	89.3	mg/kg	SW846 6010B	02/26/99	CR3E1106
		Dilution Factor: 1		Analysis Time..: 19:30		
Cadmium	ND	4.5	mg/kg	SW846 6010B	02/26/99	CR3E1107
		Dilution Factor: 1		Analysis Time..: 19:30		
Chromium	**78.2**	**8.9**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E1108**
		Dilution Factor: 1		Analysis Time..: 19:30		
Copper	**107**	**17.9**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E1109**
		Dilution Factor: 1		Analysis Time..: 19:30		
Iron	**35700**	**89.3**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E110A**
		Dilution Factor: 1		Analysis Time..: 21:16		
Lead	**72.2**	**44.6**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E110C**
		Dilution Factor: 1		Analysis Time..: 19:30		
Zinc	**296**	**17.9**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E110D**
		Dilution Factor: 1		Analysis Time..: 19:30		

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#22

TOTAL Metals

Lot-Sample #...: D9B240185-005 **Matrix.......:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9056141						
Mercury	ND	0.11	mg/kg	SW846 7471A	02/25-02/26/99	CR3E310E
		Dilution Factor: 1		Analysis Time..: 11:30		
Prep Batch #...: 9056181						
Aluminum	**3340**	**34.7**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E3105**
		Dilution Factor: 1		Analysis Time..: 19:34		
Arsenic	ND	34.7	mg/kg	SW846 6010B	02/26/99	CR3E3106
		Dilution Factor: 1		Analysis Time..: 19:34		
Cadmium	ND	1.7	mg/kg	SW846 6010B	02/26/99	CR3E3107
		Dilution Factor: 1		Analysis Time..: 19:34		
Chromium	**15.3**	**3.5**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E3108**
		Dilution Factor: 1		Analysis Time..: 19:34		
Copper	**11.4**	**6.9**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E3109**
		Dilution Factor: 1		Analysis Time..: 19:34		
Iron	**7950**	**34.7**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E310A**
		Dilution Factor: 1		Analysis Time..: 21:20		
Lead	**10.1 B**	**17.3**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E310C**
		Dilution Factor: 1		Analysis Time..: 19:34		
Zinc	**46.3**	**6.9**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E310D**
		Dilution Factor: 1		Analysis Time..: 19:34		

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#26

TOTAL Metals

Lot-Sample #...: D9B240185-006 Matrix.......: SOLID
Date Sampled...: 02/22/99 Date Received..: 02/24/99

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9056141						
Mercury	ND	0.11	mg/kg	SW846 7471A	02/25-02/26/99	CR3E610E
		Dilution Factor: 1		Analysis Time..: 11:37		
Prep Batch #...: 9056181						
Aluminum	**3060**	**32.5**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E6105**
		Dilution Factor: 1		Analysis Time..: 19:39		
Arsenic	ND	32.5	mg/kg	SW846 6010B	02/26/99	CR3E6106
		Dilution Factor: 1		Analysis Time..: 19:39		
Cadmium	ND	1.6	mg/kg	SW846 6010B	02/26/99	CR3E6107
		Dilution Factor: 1		Analysis Time..: 19:39		
Chromium	**14.7**	**3.3**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E6108**
		Dilution Factor: 1		Analysis Time..: 19:39		
Copper	**10**	**6.5**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E6109**
		Dilution Factor: 1		Analysis Time..: 19:39		
Iron	**7120**	**32.5**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E610A**
		Dilution Factor: 1		Analysis Time..: 21:24		
Lead	**8.9 B**	**16.3**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E610C**
		Dilution Factor: 1		Analysis Time..: 19:39		
Zinc	**36.4**	**6.5**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E610D**
		Dilution Factor: 1		Analysis Time..: 19:39		

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#27

TOTAL Metals

Lot-Sample #...: D9B240185-007 **Matrix.......:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9056141						
Mercury	ND	0.094	mg/kg	SW846 7471A	02/25-02/26/99	CR3E910E
		Dilution Factor: 1		Analysis Time..: 11:39		
Prep Batch #...: 9056181						
Aluminum	**1700**	**28.6**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E9105**
		Dilution Factor: 1		Analysis Time..: 19:44		
Arsenic	ND	28.6	mg/kg	SW846 6010B	02/26/99	CR3E9106
		Dilution Factor: 1		Analysis Time..: 19:44		
Cadmium	ND	1.4	mg/kg	SW846 6010B	02/26/99	CR3E9107
		Dilution Factor: 1		Analysis Time..: 19:44		
Chromium	**8.6**	**2.9**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E9108**
		Dilution Factor: 1		Analysis Time..: 19:44		
Copper	**9.3**	**5.7**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E9109**
		Dilution Factor: 1		Analysis Time..: 19:44		
Iron	**3540**	**28.6**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E910A**
		Dilution Factor: 1		Analysis Time..: 21:28		
Lead	ND	14.3	mg/kg	SW846 6010B	02/26/99	CR3E910C
		Dilution Factor: 1		Analysis Time..: 19:44		
Zinc	**25.0**	**5.7**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3E910D**
		Dilution Factor: 1		Analysis Time..: 19:44		

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#30

TOTAL Metals

Lot-Sample #...: D9B240185-008 Matrix.......: SOLID
Date Sampled...: 02/22/99 Date Received..: 02/24/99

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9056141						
Mercury	ND	0.14	mg/kg	SW846 7471A	02/25-02/26/99	CR3EP10E
		Dilution Factor: 1		Analysis Time..: 11:42		
Prep Batch #...: 9056181						
Aluminum	**6000**	**42.4**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3EP105**
		Dilution Factor: 1		Analysis Time..: 19:48		
Arsenic	ND	42.4	mg/kg	SW846 6010B	02/26/99	CR3EP106
		Dilution Factor: 1		Analysis Time..: 19:48		
Cadmium	ND	2.1	mg/kg	SW846 6010B	02/26/99	CR3EP107
		Dilution Factor: 1		Analysis Time..: 19:48		
Chromium	**30.6**	**4.2**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3EP108**
		Dilution Factor: 1		Analysis Time..: 19:48		
Copper	**12.3**	**8.5**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3EP109**
		Dilution Factor: 1		Analysis Time..: 19:48		
Iron	**8320**	**42.4**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3EP10A**
		Dilution Factor: 1		Analysis Time..: 21:32		
Lead	**10.7 B**	**21.2**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3EP10C**
		Dilution Factor: 1		Analysis Time..: 19:48		
Zinc	**29.3**	**8.5**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3EP10D**
		Dilution Factor: 1		Analysis Time..: 19:48		

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#60

TOTAL Metals

Lot-Sample #...: D9B240185-009 **Matrix.......:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9056141						
Mercury	ND	0.35	mg/kg	SW846 7471A	02/25-02/26/99	CR3EW10E
		Dilution Factor: 1		Analysis Time..: 11:44		
Prep Batch #...: 9056181						
Aluminum	**26300**	**105**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3EW105**
		Dilution Factor: 1		Analysis Time..: 19:53		
Arsenic	ND	105	mg/kg	SW846 6010B	02/26/99	CR3EW106
		Dilution Factor: 1		Analysis Time..: 19:53		
Cadmium	ND	5.3	mg/kg	SW846 6010B	02/26/99	CR3EW107
		Dilution Factor: 1		Analysis Time..: 19:53		
Chromium	**127**	**10.5**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3EW108**
		Dilution Factor: 1		Analysis Time..: 19:53		
Copper	**80.4**	**21.1**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3EW109**
		Dilution Factor: 1		Analysis Time..: 19:53		
Iron	**41400**	**105**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3EW10A**
		Dilution Factor: 1		Analysis Time..: 21:36		
Lead	**55.5**	**52.7**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3EW10C**
		Dilution Factor: 1		Analysis Time..: 19:53		
Zinc	**223**	**21.1**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3EW10D**
		Dilution Factor: 1		Analysis Time..: 19:53		

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#33

TOTAL Metals

Lot-Sample #...: D9B240185-010 **Matrix.......:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9056141						
Mercury	ND	0.086	mg/kg	SW846 7471A	02/25-02/26/99	CR3F510E
		Dilution Factor: 1		Analysis Time..: 11:46		
Prep Batch #...: 9056181						
Aluminum	**1630**	**26.1**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3F5105**
		Dilution Factor: 1		Analysis Time..: 19:58		
Arsenic	ND	26.1	mg/kg	SW846 6010B	02/26/99	CR3F5106
		Dilution Factor: 1		Analysis Time..: 19:58		
Cadmium	ND	1.3	mg/kg	SW846 6010B	02/26/99	CR3F5107
		Dilution Factor: 1		Analysis Time..: 19:58		
Chromium	**8.5**	**2.6**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3F5108**
		Dilution Factor: 1		Analysis Time..: 19:58		
Copper	**2.7 B**	**5.2**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3F5109**
		Dilution Factor: 1		Analysis Time..: 19:58		
Iron	**2220**	**26.1**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3F510A**
		Dilution Factor: 1		Analysis Time..: 21:40		
Lead	ND	13.1	mg/kg	SW846 6010B	02/26/99	CR3F510C
		Dilution Factor: 1		Analysis Time..: 19:58		
Zinc	**7.4**	**5.2**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR3F510D**
		Dilution Factor: 1		Analysis Time..: 19:58		

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#4

General Chemistry

Lot-Sample #...: D9B240185-001 **Work Order #...:** CR3CF **Matrix.........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Moisture	**95.5**	**0.10**	**%**	**MCAWW 160.3 MOD**	**03/03/99**	**9062255**
		Dilution Factor: 1		Analysis Time..: 00:00		

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#12

General Chemistry

Lot-Sample #...: D9B240185-002 **Work Order #...:** CR3DN **Matrix..........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Moisture	**86.1**	**0.10**	**%**	**MCAWW 160.3 MOD**	**03/03/99**	**9062255**
		Dilution Factor: 1		Analysis Time..: 00:00		

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#14

General Chemistry

Lot-Sample #...: D9B240185-003 **Work Order #...:** CR3DV **Matrix..........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Moisture	**82.3**	**0.10**	**%**	**MCAWW 160.3 MOD**	**03/03/99**	**9062255**
		Dilution Factor: 1		Analysis Time..: 00:00		

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#18

General Chemistry

Lot-Sample #...: D9B240185-004 **Work Order #...:** CR3E1 **Matrix..........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Moisture	**88.8**	**0.10**	**%**	**MCAWW 160.3 MOD**	**03/03/99**	**9062255**
		Dilution Factor: 1		Analysis Time..: 00:00		

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#22

General Chemistry

Lot-Sample #...: D9B240185-005 **Work Order #...:** CR3E3 **Matrix..........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Moisture	**71.2**	**0.10**	**%**	**MCAWW 160.3 MOD**	**03/03/99**	**9062255**
		Dilution Factor: 1		Analysis Time..: 00:00		

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#26

General Chemistry

Lot-Sample #...: D9B240185-006 **Work Order #...:** CR3E6 **Matrix.........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Moisture	**69.3**	**0.10**	**%**	**MCAWW 160.3 MOD**	**03/03/99**	**9062255**
		Dilution Factor: 1		Analysis Time..: 00:00		

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#27

General Chemistry

Lot-Sample #...: D9B240185-007 **Work Order #...:** CR3E9 **Matrix.........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Moisture	**65.1**	**0.10**	**%**	**MCAWW 160.3 MOD**	**03/03/99**	**9062255**
		Dilution Factor: 1		Analysis Time..: 00:00		

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#30

General Chemistry

Lot-Sample #...: D9B240185-008 **Work Order #...:** CR3EP **Matrix..........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Moisture	**76.4**	**0.10**	**%**	**MCAWW 160.3 MOD**	**03/03/99**	**9062255**
		Dilution Factor: 1		Analysis Time..: 00:00		

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#60

General Chemistry

Lot-Sample #...: D9B240185-009 Work Order #...: CR3EW Matrix..........: SOLID
Date Sampled...: 02/22/99 Date Received..: 02/24/99

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Moisture	90.5	0.10	%	MCAWW 160.3 MOD	03/03/99	9062255
	Dilution Factor: 1			Analysis Time..: 00:00		

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

US GEOLOGICAL SURVEY

Client Sample ID: FL00108 SITE#33

General Chemistry

Lot-Sample #...: D9B240185-010 **Work Order #...:** CR3F5 **Matrix.........:** SOLID
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Moisture	**61.7**	**0.10**	**%**	**MCAWW 160.3 MOD**	**03/03/99**	**9062255**
		Dilution Factor: 1		Analysis Time..: 00:00		

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

QC DATA ASSOCIATION SUMMARY

D9B240185

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	SOLID	SW846 8080A		9067354	9067175
	SOLID	SW846 7471A		9056141	9056036
	SOLID	SW846 6010B		9056181	9056053
	SOLID	SW846 8310		9056304	9056118
	SOLID	MCAWW 160.3 MOD		9062255	
	SOLID	SW846 8140		9067270	9067126
002	SOLID	SW846 8080A		9067354	9067175
	SOLID	SW846 7471A		9056141	9056036
	SOLID	SW846 6010B		9056181	9056053
	SOLID	SW846 8310		9056304	9056118
	SOLID	MCAWW 160.3 MOD		9062255	
	SOLID	SW846 8140		9067270	9067126
003	SOLID	SW846 8080A		9067354	9067175
	SOLID	SW846 7471A		9056141	9056036
	SOLID	SW846 6010B		9056181	9056053
	SOLID	SW846 8310		9056304	9056118
	SOLID	MCAWW 160.3 MOD		9062255	
	SOLID	SW846 8140		9067270	9067126
004	SOLID	SW846 8080A		9067354	9067175
	SOLID	SW846 7471A		9056141	9056036
	SOLID	SW846 6010B		9056181	9056053
	SOLID	SW846 8310		9056304	9056118
	SOLID	MCAWW 160.3 MOD		9062255	
	SOLID	SW846 8140		9067270	9067126
005	SOLID	SW846 8080A		9067354	9067175
	SOLID	SW846 7471A		9056141	9056036
	SOLID	SW846 6010B		9056181	9056053
	SOLID	SW846 8310		9056304	9056118
	SOLID	MCAWW 160.3 MOD		9062255	
	SOLID	SW846 8140		9067270	9067126
006	SOLID	SW846 8080A		9067354	9067175
	SOLID	SW846 7471A		9056141	9056036
	SOLID	SW846 6010B		9056181	9056053
	SOLID	SW846 8310		9056304	9056118
	SOLID	MCAWW 160.3 MOD		9062255	
	SOLID	SW846 8140		9067270	9067126

(Continued on next page)

QC DATA ASSOCIATION SUMMARY

D9B240185

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
007	SOLID	SW846 8080A		9067354	9067175
	SOLID	SW846 7471A		9056141	9056036
	SOLID	SW846 6010B		9056181	9056053
	SOLID	SW846 8310		9056304	9056118
	SOLID	MCAWW 160.3 MOD		9062255	
	SOLID	SW846 8140		9067270	9067126
008	SOLID	SW846 8080A		9067354	9067175
	SOLID	SW846 7471A		9056141	9056036
	SOLID	SW846 6010B		9056181	9056053
	SOLID	SW846 8310		9056304	9056118
	SOLID	MCAWW 160.3 MOD		9062255	
	SOLID	SW846 8140		9067270	9067126
009	SOLID	SW846 8080A		9067354	9067175
	SOLID	SW846 7471A		9056141	9056036
	SOLID	SW846 6010B		9056181	9056053
	SOLID	SW846 8310		9056304	9056118
	SOLID	MCAWW 160.3 MOD		9062255	
	SOLID	SW846 8140		9067270	9067126
010	SOLID	SW846 8080A		9067354	9067175
	SOLID	SW846 7471A		9056141	9056036
	SOLID	SW846 6010B		9056181	9056053
	SOLID	SW846 8310		9056304	9056118
	SOLID	MCAWW 160.3 MOD		9062255	
	SOLID	SW846 8140		9067270	9067126

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC Semivolatiles

Client Lot #...: D9B240185 **Work Order #...:** CRF2K102-LCS **Matrix.........:** SOLID
LCS Lot-Sample#: D9C080000-354 CRF2K103-LCSD
Prep Date......: 03/08/99 **Analysis Date..:** 03/28/99
Prep Batch #...: 9067354 **Analysis Time..:** 06:08
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
4,4'-DDT	**72**	**(60 - 133)**			**SW846 8080A**
	74	**(60 - 133)**	**2.2**	**(0-16)**	**SW846 8080A**
Aldrin	**95**	**(73 - 129)**			**SW846 8080A**
	95	**(73 - 129)**	**0.27**	**(0-16)**	**SW846 8080A**
Dieldrin	**90**	**(58 - 118)**			**SW846 8080A**
	91	**(58 - 118)**	**0.90**	**(0-16)**	**SW846 8080A**
Endrin	**92**	**(64 - 125)**			**SW846 8080A**
	93	**(64 - 125)**	**1.0**	**(0-17)**	**SW846 8080A**
gamma-BHC (Lindane)	**36**	**(34 - 158)**			**SW846 8080A**
	36	**(34 - 158)**	**0.18**	**(0-15)**	**SW846 8080A**
Heptachlor	**98**	**(74 - 134)**			**SW846 8080A**
	98	**(74 - 134)**	**0.54**	**(0-15)**	**SW846 8080A**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Decachlorobiphenyl	95	(62 - 139)
	97	(62 - 139)
Tetrachloro-m-xylene	82	(46 - 117)
	82	(46 - 117)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE DATA REPORT

GC Semivolatiles

Client Lot #...: D9B240185 **Work Order #...:** CRF2K102-LCS **Matrix.........:** SOLID
LCS Lot-Sample#: D9C080000-354 CRF2K103-LCSD
Prep Date......: 03/08/99 **Analysis Date..:** 03/28/99
Prep Batch #...: 9067354 **Analysis Time..:** 06:08
Dilution Factor: 1

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	RPD	METHOD
4,4'-DDT	**16.7**	**12.1**	**ug/kg**	**72**		**SW846 8080A**
	16.7	**12.4**	**ug/kg**	**74**	**2.2**	**SW846 8080A**
Aldrin	**6.67**	**6.31**	**ug/kg**	**95**		**SW846 8080A**
	6.67	**6.33**	**ug/kg**	**95**	**0.27**	**SW846 8080A**
Dieldrin	**16.7**	**15.1**	**ug/kg**	**90**		**SW846 8080A**
	16.7	**15.2**	**ug/kg**	**91**	**0.90**	**SW846 8080A**
Endrin	**16.7**	**15.4**	**ug/kg**	**92**		**SW846 8080A**
	16.7	**15.6**	**ug/kg**	**93**	**1.0**	**SW846 8080A**
gamma-BHC (Lindane)	**6.67**	**2.42**	**ug/kg**	**36**		**SW846 8080A**
	6.67	**2.41**	**ug/kg**	**36**	**0.18**	**SW846 8080A**
Heptachlor	**6.67**	**6.50**	**ug/kg**	**98**		**SW846 8080A**
	6.67	**6.54**	**ug/kg**	**98**	**0.54**	**SW846 8080A**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Decachlorobiphenyl	95	(62 - 139)
	97	(62 - 139)
Tetrachloro-m-xylene	82	(46 - 117)
	82	(46 - 117)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

METHOD BLANK REPORT

GC Semivolatiles

Client Lot #...: D9B240185
MB Lot-Sample #: D9C080000-354
Work Order #...: CRF2K101
Matrix.........: SOLID

Prep Date......: 03/08/99
Analysis Time..: 05:34
Analysis Date..: 03/28/99
Prep Batch #...: 9067354
Dilution Factor: 1

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Aldrin	ND	1.7	ug/kg	SW846 8080A
alpha-BHC	ND	1.7	ug/kg	SW846 8080A
beta-BHC	ND	1.7	ug/kg	SW846 8080A
delta-BHC	ND	1.7	ug/kg	SW846 8080A
gamma-BHC (Lindane)	ND	1.7	ug/kg	SW846 8080A
Chlordane (technical)	ND	17	ug/kg	SW846 8080A
alpha-Chlordane	ND	1.7	ug/kg	SW846 8080A
gamma-Chlordane	ND	1.7	ug/kg	SW846 8080A
Chlorobenzilate	ND	33	ug/kg	SW846 8080A
4,4'-DDD	ND	3.3	ug/kg	SW846 8080A
4,4'-DDE	ND	3.3	ug/kg	SW846 8080A
4,4'-DDT	ND	3.3	ug/kg	SW846 8080A
Diallate	ND	33	ug/kg	SW846 8080A
Dieldrin	ND	3.3	ug/kg	SW846 8080A
Endosulfan I	ND	1.7	ug/kg	SW846 8080A
Endosulfan II	ND	3.3	ug/kg	SW846 8080A
Endosulfan sulfate	ND	3.3	ug/kg	SW846 8080A
Endrin	ND	3.3	ug/kg	SW846 8080A
Endrin aldehyde	ND	3.3	ug/kg	SW846 8080A
Endrin ketone	ND	3.3	ug/kg	SW846 8080A
Heptachlor	ND	1.7	ug/kg	SW846 8080A
Heptachlor epoxide	ND	1.7	ug/kg	SW846 8080A
Isodrin	ND	3.3	ug/kg	SW846 8080A
Kepone	ND	83	ug/kg	SW846 8080A
Methoxychlor	ND	17	ug/kg	SW846 8080A
Aroclor 1016	ND	33	ug/kg	SW846 8080A
Aroclor 1221	ND	33	ug/kg	SW846 8080A
Aroclor 1232	ND	33	ug/kg	SW846 8080A
Aroclor 1242	ND	33	ug/kg	SW846 8080A
Aroclor 1248	ND	33	ug/kg	SW846 8080A
Aroclor 1254	ND	33	ug/kg	SW846 8080A
Aroclor 1260	ND	33	ug/kg	SW846 8080A
Toxaphene	ND	170	ug/kg	SW846 8080A

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Decachlorobiphenyl	89	(62 - 139)
Tetrachloro-m-xylene	82	(46 - 117)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

GC Semivolatiles

Client Lot #...: D9B240185
MS Lot-Sample #: D9B240185-010
Date Sampled...: 02/22/99
Prep Date......: 03/08/99
Prep Batch #...: 9067354
Dilution Factor: 1

Work Order #...: CR3F510G-MS
CR3F510H-MSD
Date Received..: 02/24/99
Analysis Date..: 03/28/99
Analysis Time..: 14:07

Matrix.........: SOLID

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Aldrin	**106**	**(73 - 129)**			**SW846 8080A**
	106	**(73 - 129)**	**0.70**	**(0-16)**	**SW846 8080A**
gamma-BHC (Lindane)	**39**	**(34 - 158)**			**SW846 8080A**
	39	**(34 - 158)**	**0.31**	**(0-15)**	**SW846 8080A**
4,4'-DDT	**74**	**(60 - 133)**			**SW846 8080A**
	76	**(60 - 133)**	**2.3**	**(0-16)**	**SW846 8080A**
Dieldrin	**98**	**(58 - 118)**			**SW846 8080A**
	95	**(58 - 118)**	**2.5**	**(0-16)**	**SW846 8080A**
Endrin	**100**	**(64 - 125)**			**SW846 8080A**
	98	**(64 - 125)**	**2.4**	**(0-17)**	**SW846 8080A**
Heptachlor	**96**	**(74 - 134)**			**SW846 8080A**
	98	**(74 - 134)**	**1.4**	**(0-15)**	**SW846 8080A**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Decachlorobiphenyl	87	(62 - 139)
	87	(62 - 139)
Tetrachloro-m-xylene	78	(46 - 117)
	80	(46 - 117)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

Results and reporting limits have been adjusted for dry weight.

MATRIX SPIKE SAMPLE DATA REPORT

GC Semivolatiles

Client Lot #...:	D9B240185	**Work Order #...:**	CR3F510G-MS	**Matrix.........:**	SOLID
MS Lot-Sample #:	D9B240185-010		CR3F510H-MSD		
Date Sampled...:	02/22/99	**Date Received..:**	02/24/99		
Prep Date......:	03/08/99	**Analysis Date..:**	03/28/99		
Prep Batch #...:	9067354	**Analysis Time..:**	14:07		
Dilution Factor:	1				

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCENT RECOVERY	RPD	METHOD
Aldrin	**ND**	**17.4**	**18.5**	**ug/kg**	**106**		**SW846 8080A**
	ND	**17.4**	**18.4**	**ug/kg**	**106**	**0.70**	**SW846 8080A**
gamma-BHC (Lindane)	**ND**	**17.4**	**6.79**	**ug/kg**	**39**		**SW846 8080A**
	ND	**17.4**	**6.81**	**ug/kg**	**39**	**0.31**	**SW846 8080A**
4,4'-DDT	**ND**	**43.6**	**32.4**	**ug/kg**	**74**		**SW846 8080A**
	ND	**43.6**	**33.1**	**ug/kg**	**76**	**2.3**	**SW846 8080A**
Dieldrin	**ND**	**43.6**	**42.7**	**ug/kg**	**98**		**SW846 8080A**
	ND	**43.6**	**41.6**	**ug/kg**	**95**	**2.5**	**SW846 8080A**
Endrin	**ND**	**43.6**	**43.8**	**ug/kg**	**100**		**SW846 8080A**
	ND	**43.6**	**42.8**	**ug/kg**	**98**	**2.4**	**SW846 8080A**
Heptachlor	**ND**	**17.4**	**16.8**	**ug/kg**	**96**		**SW846 8080A**
	ND	**17.4**	**17.0**	**ug/kg**	**98**	**1.4**	**SW846 8080A**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Decachlorobiphenyl	87	(62 - 139)
	87	(62 - 139)
Tetrachloro-m-xylene	78	(46 - 117)
	80	(46 - 117)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

Results and reporting limits have been adjusted for dry weight.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC Semivolatiles

Client Lot #...: D9B240185 **Work Order #...:** CREM3102-LCS **Matrix.........:** SOLID
LCS Lot-Sample#: D9C080000-270 CREM3103-LCSD
Prep Date......: 03/08/99 **Analysis Date..:** 03/10/99
Prep Batch #...: 9067270 **Analysis Time..:** 05:41
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Diazinon	**104**	**(52 - 139)**			**SW846 8140**
	100	**(52 - 139)**	**4.0**	**(0-22)**	**SW846 8140**
Ethyl parathion	**228 a**	**(61 - 150)**			**SW846 8140**
	198 a	**(61 - 150)**	**14**	**(0-23)**	**SW846 8140**
Malathion	**112**	**(58 - 121)**			**SW846 8140**
	106	**(58 - 121)**	**5.3**	**(0-16)**	**SW846 8140**
Methyl parathion	**107**	**(67 - 115)**			**SW846 8140**
	103	**(67 - 115)**	**3.8**	**(0-15)**	**SW846 8140**
Phorate	**99**	**(1.0- 116)**			**SW846 8140**
	97	**(1.0- 116)**	**1.9**	**(0-50)**	**SW846 8140**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Ethyl Pirimifos	101	(55 - 105)
	99	(55 - 105)
Chlormefos	90	(50 - 150)
	89	(50 - 150)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

a Spiked analyte recovery is outside stated control limits.

LABORATORY CONTROL SAMPLE DATA REPORT

GC Semivolatiles

Client Lot #...: D9B240185 **Work Order #...:** CREM3102-LCS **Matrix.........:** SOLID
LCS Lot-Sample#: D9C080000-270 CREM3103-LCSD
Prep Date......: 03/08/99 **Analysis Date..:** 03/10/99
Prep Batch #...: 9067270 **Analysis Time..:** 05:41
Dilution Factor: 1

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	RPD	METHOD
Diazinon	**167**	**173**	**ug/kg**	**104**		**SW846 8140**
	167	**166**	**ug/kg**	**100**	**4.0**	**SW846 8140**
Ethyl parathion	**167**	**381 a**	**ug/kg**	**228**		**SW846 8140**
	167	**330 a**	**ug/kg**	**198**	**14**	**SW846 8140**
Malathion	**167**	**186**	**ug/kg**	**112**		**SW846 8140**
	167	**177**	**ug/kg**	**106**	**5.3**	**SW846 8140**
Methyl parathion	**167**	**179**	**ug/kg**	**107**		**SW846 8140**
	167	**172**	**ug/kg**	**103**	**3.8**	**SW846 8140**
Phorate	**167**	**165**	**ug/kg**	**99**		**SW846 8140**
	167	**162**	**ug/kg**	**97**	**1.9**	**SW846 8140**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Ethyl Pirimifos	101	(55 - 105)
	99	(55 - 105)
Chlormefos	90	(50 - 150)
	89	(50 - 150)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

a Spiked analyte recovery is outside stated control limits.

METHOD BLANK REPORT

GC Semivolatiles

Client Lot #...: D9B240185
MB Lot-Sample #: D9C080000-270

Work Order #...: CREM3101

Matrix.........: SOLID

Prep Date.......: 03/08/99
Prep Batch #...: 9067270

Analysis Time..: 05:08

Analysis Date..: 03/10/99
Dilution Factor: 1

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Azinphos-methyl	ND	83	ug/kg	SW846 8140
Bolstar	ND	17	ug/kg	SW846 8140
Chlorpyrifos	ND	17	ug/kg	SW846 8140
Coumaphos	ND	17	ug/kg	SW846 8140
Demeton (total)	ND	17	ug/kg	SW846 8140
Diazinon	ND	17	ug/kg	SW846 8140
Dichlorvos	ND	17	ug/kg	SW846 8140
Dimethoate	ND	17	ug/kg	SW846 8140
Disulfoton	ND	17	ug/kg	SW846 8140
Ethoprop	ND	17	ug/kg	SW846 8140
Ethyl parathion	ND	17	ug/kg	SW846 8140
Fensulfothion	ND	83	ug/kg	SW846 8140
Fenthion	ND	17	ug/kg	SW846 8140
Malathion	ND	42	ug/kg	SW846 8140
Merphos	ND	17	ug/kg	SW846 8140
Methyl parathion	ND	17	ug/kg	SW846 8140
Mevinphos	ND	210	ug/kg	SW846 8140
Naled	ND	330	ug/kg	SW846 8140
Phorate	ND	17	ug/kg	SW846 8140
Ronnel	ND	17	ug/kg	SW846 8140
Sulfotepp	ND	17	ug/kg	SW846 8140
Tokuthion	ND	17	ug/kg	SW846 8140
Trichloronate	ND	17	ug/kg	SW846 8140
Tetrachlorvinphos (Stirop	ND	83	ug/kg	SW846 8140

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Ethyl Pirimifos	78	(55 - 105)
Chlormefos	83	(50 - 150)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

GC Semivolatiles

Client Lot #...: D9B240185 **Work Order #...:** CR3E310G-MS CR3E310H-MSD **Matrix.........:** SOLID
MS Lot-Sample #: D9B240185-005
Date Sampled...: 02/22/99 **Date Received..:** 02/24/99
Prep Date......: 03/08/99 **Analysis Date..:** 03/10/99
Prep Batch #...: 9067270 **Analysis Time..:** 09:31
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Diazinon	**110**	**(52 - 139)**			**SW846 8140**
	137	**(52 - 139)**	**22**	**(0-22)**	**SW846 8140**
Ethyl parathion	**112**	**(61 - 150)**			**SW846 8140**
	115	**(61 - 150)**	**2.9**	**(0-23)**	**SW846 8140**
Malathion	**98**	**(58 - 121)**			**SW846 8140**
	101	**(58 - 121)**	**2.8**	**(0-16)**	**SW846 8140**
Methyl parathion	**102**	**(67 - 115)**			**SW846 8140**
	104	**(67 - 115)**	**1.9**	**(0-15)**	**SW846 8140**
Phorate	**82**	**(1.0- 116)**			**SW846 8140**
	83	**(1.0- 116)**	**0.79**	**(0-50)**	**SW846 8140**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Ethyl Pirimifos	94	(55 - 105)
	96	(55 - 105)
Chlormefos	81	(50 - 150)
	80	(50 - 150)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

Results and reporting limits have been adjusted for dry weight.

MATRIX SPIKE SAMPLE DATA REPORT

GC Semivolatiles

Client Lot #...: D9B240185
MS Lot-Sample #: D9B240185-005
Date Sampled...: 02/22/99
Prep Date......: 03/08/99
Prep Batch #...: 9067270
Dilution Factor: 1

Work Order #...: CR3E310G-MS
CR3E310H-MSD
Date Received..: 02/24/99
Analysis Date..: 03/10/99
Analysis Time..: 09:31

Matrix.........: SOLID

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCENT RECOVERY	RPD	METHOD
Diazinon	**ND**	**578**	**636**	**ug/kg**	**110**		**SW846 8140**
	ND	**578**	**792**	**ug/kg**	**137**	**22**	**SW846 8140**
Ethyl parathion	**ND**	**578**	**645**	**ug/kg**	**112**		**SW846 8140**
	ND	**578**	**664**	**ug/kg**	**115**	**2.9**	**SW846 8140**
Malathion	**ND**	**578**	**566**	**ug/kg**	**98**		**SW846 8140**
	ND	**578**	**582**	**ug/kg**	**101**	**2.8**	**SW846 8140**
Methyl parathion	**ND**	**578**	**592**	**ug/kg**	**102**		**SW846 8140**
	ND	**578**	**603**	**ug/kg**	**104**	**1.9**	**SW846 8140**
Phorate	**ND**	**578**	**477**	**ug/kg**	**82**		**SW846 8140**
	ND	**578**	**480**	**ug/kg**	**83**	**0.79**	**SW846 8140**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Ethyl Pirimifos	94	(55 - 105)
	96	(55 - 105)
Chlormefos	81	(50 - 150)
	80	(50 - 150)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

Results and reporting limits have been adjusted for dry weight.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

HPLC

Client Lot #...: D9B240185
LCS Lot-Sample#: D9B250000-304
Prep Date......: 02/25/99
Prep Batch #...: 9056304
Dilution Factor: 1
Work Order #...: CR51K102-LCS
CR51K103-LCSD
Analysis Date..: 03/05/99
Analysis Time..: 05:02
Matrix.........: SOLID

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Benzo(a)pyrene	**94**	**(61 - 128)**			**SW846 8310**
	101	**(61 - 128)**	**7.1**	**(0-34)**	**SW846 8310**
Fluorene	**68**	**(63 - 138)**			**SW846 8310**
	91 p	**(63 - 138)**	**29**	**(0-22)**	**SW846 8310**
Indeno(1,2,3-cd)pyrene	**106**	**(69 - 127)**			**SW846 8310**
	105	**(69 - 127)**	**0.70**	**(0-15)**	**SW846 8310**
Naphthalene	**127**	**(60 - 138)**			**SW846 8310**
	104	**(60 - 138)**	**20**	**(0-26)**	**SW846 8310**
Pyrene	**93**	**(59 - 136)**			**SW846 8310**
	99	**(59 - 136)**	**6.3**	**(0-20)**	**SW846 8310**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	62	(57 - 140)
	64	(57 - 140)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

p Relative percent difference (RPD) is outside stated control limits.

LABORATORY CONTROL SAMPLE DATA REPORT

HPLC

Client Lot #...: D9B240185 **Work Order #...:** CR51K102-LCS **Matrix.........:** SOLID
LCS Lot-Sample#: D9B250000-304 CR51K103-LCSD
Prep Date......: 02/25/99 **Analysis Date..:** 03/05/99
Prep Batch #...: 9056304 **Analysis Time..:** 05:02
Dilution Factor: 1

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	RPD	METHOD
Benzo(a)pyrene	**533**	**501**	**ug/kg**	**94**		**SW846 8310**
	533	**538**	**ug/kg**	**101**	**7.1**	**SW846 8310**
Fluorene	**533**	**362**	**ug/kg**	**68**		**SW846 8310**
	533	**487 p**	**ug/kg**	**91**	**29**	**SW846 8310**
Indeno(1,2,3-cd)pyrene	**533**	**566**	**ug/kg**	**106**		**SW846 8310**
	533	**562**	**ug/kg**	**105**	**0.70**	**SW846 8310**
Naphthalene	**533**	**678**	**ug/kg**	**127**		**SW846 8310**
	533	**555**	**ug/kg**	**104**	**20**	**SW846 8310**
Pyrene	**533**	**495**	**ug/kg**	**93**		**SW846 8310**
	533	**527**	**ug/kg**	**99**	**6.3**	**SW846 8310**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	62	(57 - 140)
	64	(57 - 140)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

p Relative percent difference (RPD) is outside stated control limits.

METHOD BLANK REPORT

HPLC

Client Lot #...: D9B240185
MB Lot-Sample #: D9B250000-304

Analysis Date..: 03/05/99
Dilution Factor: 1

Work Order #...: CR51K101

Prep Date......: 02/25/99
Prep Batch #...: 9056304

Matrix.........: SOLID

Analysis Time..: 04:33

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Acenaphthene	ND	200	ug/kg	SW846 8310
Acenaphthylene	ND	200	ug/kg	SW846 8310
Anthracene	ND	20	ug/kg	SW846 8310
Benzo(a)anthracene	ND	20	ug/kg	SW846 8310
Benzo(a)pyrene	ND	20	ug/kg	SW846 8310
Benzo(b)fluoranthene	ND	20	ug/kg	SW846 8310
Benzo(ghi)perylene	ND	40	ug/kg	SW846 8310
Benzo(k)fluoranthene	ND	20	ug/kg	SW846 8310
Chrysene	ND	40	ug/kg	SW846 8310
Dibenzo(a,h)anthracene	ND	40	ug/kg	SW846 8310
Fluoranthene	ND	40	ug/kg	SW846 8310
Fluorene	ND	40	ug/kg	SW846 8310
Indeno(1,2,3-cd)pyrene	ND	40	ug/kg	SW846 8310
1-Methylnaphthalene	ND	200	ug/kg	SW846 8310
2-Methylnaphthalene	ND	200	ug/kg	SW846 8310
Naphthalene	ND	200	ug/kg	SW846 8310
Phenanthrene	ND	40	ug/kg	SW846 8310
Pyrene	ND	40	ug/kg	SW846 8310

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	63	(57 - 140)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

HPLC

Client Lot #...: D9B240185
MS Lot-Sample #: D9B240185-001
Date Sampled...: 02/22/99
Prep Date......: 02/25/99
Prep Batch #...: 9056304
Dilution Factor: 2

Work Order #...: CR3CF10F-MS
CR3CF10G-MSD
Date Received..: 02/24/99
Analysis Date..: 03/12/99
Analysis Time..: 15:21

Matrix.........: SOLID

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Benzo(a)pyrene	**73**	**(61 - 128)**			**SW846 8310**
	47 a,p	**(61 - 128)**	**42**	**(0-34)**	**SW846 8310**
Fluorene	**113**	**(63 - 138)**			**SW846 8310**
	101	**(63 - 138)**	**11**	**(0-22)**	**SW846 8310**
Indeno(1,2,3-cd)pyrene	**109**	**(69 - 127)**			**SW846 8310**
	95	**(69 - 127)**	**14**	**(0-15)**	**SW846 8310**
Naphthalene	**86**	**(60 - 138)**			**SW846 8310**
	64 p	**(60 - 138)**	**29**	**(0-26)**	**SW846 8310**
Pyrene	**109**	**(59 - 136)**			**SW846 8310**
	85 p	**(59 - 136)**	**25**	**(0-20)**	**SW846 8310**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	74	(57 - 140)
	71	(57 - 140)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

a Spiked analyte recovery is outside stated control limits.

p Relative percent difference (RPD) is outside stated control limits.

Results and reporting limits have been adjusted for dry weight.

MATRIX SPIKE SAMPLE DATA REPORT

HPLC

Client Lot #...: D9B240185
MS Lot-Sample #: D9B240185-001
Date Sampled...: 02/22/99
Prep Date......: 02/25/99
Prep Batch #...: 9056304
Dilution Factor: 2

Work Order #...: CR3CF10F-MS
CR3CF10G-MSD
Date Received..: 02/24/99
Analysis Date..: 03/12/99
Analysis Time..: 15:21

Matrix.........: SOLID

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCENT RECOVERY	RPD	METHOD
Benzo(a)pyrene	**ND**	**11900**	**8660**	**ug/kg**	**73**		**SW846 8310**
	ND	**11900**	**5620 a,**	**ug/kg**	**47**	**42**	**SW846 8310**
Fluorene	**ND**	**11900**	**13500**	**ug/kg**	**113**		**SW846 8310**
	ND	**11900**	**12100**	**ug/kg**	**101**	**11**	**SW846 8310**
Indeno(1,2,3-cd)pyrene	**ND**	**11900**	**13000**	**ug/kg**	**109**		**SW846 8310**
	ND	**11900**	**11300**	**ug/kg**	**95**	**14**	**SW846 8310**
Naphthalene	**ND**	**11900**	**10200**	**ug/kg**	**86**		**SW846 8310**
	ND	**11900**	**7630 p**	**ug/kg**	**64**	**29**	**SW846 8310**
Pyrene	**ND**	**11900**	**12900**	**ug/kg**	**109**		**SW846 8310**
	ND	**11900**	**10100 p**	**ug/kg**	**85**	**25**	**SW846 8310**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Terphenyl-d14	74	(57 - 140)
	71	(57 - 140)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

a Spiked analyte recovery is outside stated control limits.

p Relative percent difference (RPD) is outside stated control limits.

Results and reporting limits have been adjusted for dry weight.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Lot-Sample #...: D9B240185

Matrix.........: SOLID

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP-BATCH #
Mercury	98	(82 - 114)			SW846 7471A	02/25-02/26/99	9056141
	101	(82 - 114)	3.5	(0-10)	SW846 7471A	02/25-02/26/99	9056141
		Dilution Factor: 1					
Aluminum	100	(88 - 120)			SW846 6010B	02/26/99	9056181
	100	(88 - 120)	0.12	(0-10)	SW846 6010B	02/26/99	9056181
		Dilution Factor: 1					
Arsenic	96	(80 - 120)			SW846 6010B	02/26/99	9056181
	96	(80 - 120)	0.01	(0-10)	SW846 6010B	02/26/99	9056181
		Dilution Factor: 1					
Cadmium	102	(80 - 120)			SW846 6010B	02/26/99	9056181
	101	(80 - 120)	0.26	(0-16)	SW846 6010B	02/26/99	9056181
		Dilution Factor: 1					
Chromium	102	(83 - 112)			SW846 6010B	02/26/99	9056181
	102	(83 - 112)	0.25	(0-10)	SW846 6010B	02/26/99	9056181
		Dilution Factor: 1					
Copper	103	(84 - 115)			SW846 6010B	02/26/99	9056181
	103	(84 - 115)	0.53	(0-10)	SW846 6010B	02/26/99	9056181
		Dilution Factor: 1					
Iron	103	(87 - 117)			SW846 6010B	02/26/99	9056181
	102	(87 - 117)	0.34	(0-10)	SW846 6010B	02/26/99	9056181
		Dilution Factor: 1					
Lead	101	(82 - 114)			SW846 6010B	02/26/99	9056181
	100	(82 - 114)	0.18	(0-11)	SW846 6010B	02/26/99	9056181
		Dilution Factor: 1					
Zinc	99	(80 - 120)			SW846 6010B	02/26/99	9056181
	99	(80 - 120)	0.28	(0-10)	SW846 6010B	02/26/99	9056181
		Dilution Factor: 1					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Lot-Sample #...: D9B240185 **Matrix.........:** SOLID

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Mercury	0.417	0.407	mg/kg	98		SW846 7471A	02/25-02/26/99	9056141
	0.417	0.421	mg/kg	101	3.5	SW846 7471A	02/25-02/26/99	9056141
			Dilution Factor: 1					
Aluminum	200	200	mg/kg	100		SW846 6010B	02/26/99	9056181
	200	200	mg/kg	100	0.12	SW846 6010B	02/26/99	9056181
			Dilution Factor: 1					
Arsenic	200	192	mg/kg	96		SW846 6010B	02/26/99	9056181
	200	192	mg/kg	96	0.01	SW846 6010B	02/26/99	9056181
			Dilution Factor: 1					
Cadmium	5.00	5.08	mg/kg	102		SW846 6010B	02/26/99	9056181
	5.00	5.07	mg/kg	101	0.26	SW846 6010B	02/26/99	9056181
			Dilution Factor: 1					
Chromium	20.0	20.5	mg/kg	102		SW846 6010B	02/26/99	9056181
	20.0	20.4	mg/kg	102	0.25	SW846 6010B	02/26/99	9056181
			Dilution Factor: 1					
Copper	25.0	25.8	mg/kg	103		SW846 6010B	02/26/99	9056181
	25.0	25.7	mg/kg	103	0.53	SW846 6010B	02/26/99	9056181
			Dilution Factor: 1					
Iron	100	103	mg/kg	103		SW846 6010B	02/26/99	9056181
	100	102	mg/kg	102	0.34	SW846 6010B	02/26/99	9056181
			Dilution Factor: 1					
Lead	50.0	50.3	mg/kg	101		SW846 6010B	02/26/99	9056181
	50.0	50.2	mg/kg	100	0.18	SW846 6010B	02/26/99	9056181
			Dilution Factor: 1					
Zinc	50.0	49.5	mg/kg	99		SW846 6010B	02/26/99	9056181
	50.0	49.4	mg/kg	99	0.28	SW846 6010B	02/26/99	9056181
			Dilution Factor: 1					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: D9B240185 **Matrix.........:** SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: D9B250000-141		**Prep Batch #...:** 9056141				
Mercury	ND	0.033	mg/kg	SW846 7471A	02/25-02/26/99	CR407101
		Dilution Factor: 1 Analysis Time..: 10:00				
MB Lot-Sample #: D9B250000-181		**Prep Batch #...:** 9056181				
Aluminum	ND	10.0	mg/kg	SW846 6010B	02/26/99	CR46912A
		Dilution Factor: 1 Analysis Time..: 18:33				
Arsenic	ND	10.0	mg/kg	SW846 6010B	02/26/99	CR46912C
		Dilution Factor: 1 Analysis Time..: 18:33				
Cadmium	ND	0.50	mg/kg	SW846 6010B	02/26/99	CR46912D
		Dilution Factor: 1 Analysis Time..: 18:33				
Chromium	ND	1.0	mg/kg	SW846 6010B	02/26/99	CR46912E
		Dilution Factor: 1 Analysis Time..: 18:33				
Copper	ND	2.0	mg/kg	SW846 6010B	02/26/99	CR46912F
		Dilution Factor: 1 Analysis Time..: 18:33				
Iron	**1.4 B**	**10.0**	**mg/kg**	**SW846 6010B**	**02/26/99**	**CR469127**
		Dilution Factor: 1 Analysis Time..: 20:27				
Lead	ND	5.0	mg/kg	SW846 6010B	02/26/99	CR469128
		Dilution Factor: 1 Analysis Time..: 18:33				
Zinc	ND	2.0	mg/kg	SW846 6010B	02/26/99	CR469129
		Dilution Factor: 1 Analysis Time..: 18:33				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

B Estimated result. Result is less than RL.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: D9B240185 **Matrix.........:** SOLID
Date Sampled...: 02/23/99 15:15 **Date Received..:** 02/24/99

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: D9B240161-002 **Prep Batch #...:** 9056141							
Mercury	86	(82 - 114)			SW846 7471A	02/25-02/26/99	CR37R139
	86	(82 - 114)	0.74	(0-10)	SW846 7471A	02/25-02/26/99	CR37R13A
		Dilution Factor: 1					
		Analysis Time..: 11:16					
MS Lot-Sample #: D9B240161-002 **Prep Batch #...:** 9056181							
Aluminum	NC,MSB	(88 - 120)			SW846 6010B	02/26/99	CR37R12R
	NC,MSB	(88 - 120)		(0-10)	SW846 6010B	02/26/99	CR37R12T
		Dilution Factor: 1					
		Analysis Time..: 18:57					
Arsenic	90	(80 - 120)			SW846 6010B	02/26/99	CR37R12V
	90	(80 - 120)	0.28	(0-10)	SW846 6010B	02/26/99	CR37R12W
		Dilution Factor: 1					
		Analysis Time..: 18:57					
Cadmium	94	(80 - 120)			SW846 6010B	02/26/99	CR37R130
	95	(80 - 120)	0.48	(0-16)	SW846 6010B	02/26/99	CR37R131
		Dilution Factor: 1					
		Analysis Time..: 18:57					
Chromium	110	(83 - 112)			SW846 6010B	02/26/99	CR37R133
	107	(83 - 112)	1.9	(0-10)	SW846 6010B	02/26/99	CR37R134
		Dilution Factor: 1					
		Analysis Time..: 18:57					
Copper	98	(84 - 115)			SW846 6010B	02/26/99	CR37R136
	95	(84 - 115)	1.7	(0-10)	SW846 6010B	02/26/99	CR37R137
		Dilution Factor: 1					
		Analysis Time..: 18:57					
Iron	NC,MSB	(87 - 117)			SW846 6010B	02/26/99	CR37R12G
	NC,MSB	(87 - 117)		(0-10)	SW846 6010B	02/26/99	CR37R12H
		Dilution Factor: 1					
		Analysis Time..: 20:47					
Lead	93	(82 - 114)			SW846 6010B	02/26/99	CR37R12K
	93	(82 - 114)	0.07	(0-11)	SW846 6010B	02/26/99	CR37R12L
		Dilution Factor: 1					
		Analysis Time..: 18:57					

(Continued on next page)

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: D9B240185 **Matrix.........:** SOLID
Date Sampled...: 02/23/99 15:15 **Date Received..:** 02/24/99

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Zinc	96	(80 - 120)			SW846 6010B	02/26/99	CR37R12N
	93	(80 - 120)	1.7	(0-10)	SW846 6010B	02/26/99	CR37R12P

Dilution Factor: 1
Analysis Time..: 18:57

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Results and reporting limits have been adjusted for dry weight.

NC The recovery and/or RPD were not calculated.

MSB The recovery and RPD were not calculated because the sample amount was greater than four times the spike amount.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: D9B240185 **Matrix.........:** SOLID
Date Sampled...: 02/23/99 15:15 **Date Received..:** 02/24/99

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Lead									
	6.5	58.7	61.4	mg/kg	93		SW846 6010B	02/26/99	CR37R12K
	6.5	58.7	61.4	mg/kg	93	0.07	SW846 6010B	02/26/99	CR37R12L
			Dilution Factor: 1						
			Analysis Time..: 18:57						
Zinc									
	34.4	58.7	90.6	mg/kg	96		SW846 6010B	02/26/99	CR37R12N
	34.4	58.7	89.1	mg/kg	93	1.7	SW846 6010B	02/26/99	CR37R12P
			Dilution Factor: 1						
			Analysis Time..: 18:57						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Results and reporting limits have been adjusted for dry weight.

NC The recovery and/or RPD were not calculated.

MSB The recovery and RPD were not calculated because the sample amount was greater than four times the spike amount.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: D9B240185 **Matrix.........:** SOLID
Date Sampled...: 02/23/99 15:15 **Date Received..:** 02/24/99

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: D9B240161-002 **Prep Batch #...:** 9056141									
Mercury									
	ND	0.489	0.423	mg/kg	86		SW846 7471A	02/25-02/26/99	CR37R139
	ND	0.489	0.420	mg/kg	86	0.74	SW846 7471A	02/25-02/26/99	CR37R13A
				Dilution Factor: 1					
				Analysis Time..: 11:16					
MS Lot-Sample #: D9B240161-002 **Prep Batch #...:** 9056181									
Aluminum									
	3830	235	6990	mg/kg			SW846 6010B	02/26/99	CR37R12R
				Qualifiers: NC,MSB					
	3830	235	6900	mg/kg			SW846 6010B	02/26/99	CR37R12T
				Qualifiers: NC,MSB					
				Dilution Factor: 1					
				Analysis Time..: 18:57					
Arsenic									
	5.1	235	216	mg/kg	90		SW846 6010B	02/26/99	CR37R12V
	5.1	235	217	mg/kg	90	0.28	SW846 6010B	02/26/99	CR37R12W
				Dilution Factor: 1					
				Analysis Time..: 18:57					
Cadmium									
	0.075	5.87	5.62	mg/kg	94		SW846 6010B	02/26/99	CR37R130
	0.075	5.87	5.65	mg/kg	95	0.48	SW846 6010B	02/26/99	CR37R131
				Dilution Factor: 1					
				Analysis Time..: 18:57					
Chromium									
	6.7	23.5	32.5	mg/kg	110		SW846 6010B	02/26/99	CR37R133
	6.7	23.5	31.9	mg/kg	107	1.9	SW846 6010B	02/26/99	CR37R134
				Dilution Factor: 1					
				Analysis Time..: 18:57					
Copper									
	14.7	29.4	43.4	mg/kg	98		SW846 6010B	02/26/99	CR37R136
	14.7	29.4	42.7	mg/kg	95	1.7	SW846 6010B	02/26/99	CR37R137
				Dilution Factor: 1					
				Analysis Time..: 18:57					
Iron									
	10700	117	11900	mg/kg			SW846 6010B	02/26/99	CR37R12G
				Qualifiers: NC,MSB					
	10700	117	11000	mg/kg			SW846 6010B	02/26/99	CR37R12H
				Qualifiers: NC,MSB					
				Dilution Factor: 1					
				Analysis Time..: 20:47					

Chain of Custody Record

QUA-4124 0797

D9B240185

Quanterra

Quote 24566

Client: U.S. Geological Survey	Project Manager: Mario Fernandez	Date: 2-22-99	Chain of Custody Number: 12337
Address: 4710 Eisenhower Blvd	Telephone Number (Area Code)/Fax Number: 813-884-9336 Ext 119	Lab Number:	Page 1 of 4
City: Tampa; State: Fl; Zip Code: 33634	Site Contact:	Lab Contact:	
Project Name: FL00108	Carrier/Waybill Number:		
Contract/Purchase Order/Quote No.			

Analysis (Attach list if more space is needed)

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil	Unpres.	H2SO4	HNOS	HCl	NaOH	ZnAc/NaOH	8310	8080	8140	Trace Elements	Special Instructions/ Conditions of Receipt
FL00108 Site# 4-1	2-22-99			✓								✓			X	Al, As, Cd, Cr, Cu, Fe, Pb, Zinc, Hg
FL00108 Site #4-2	11			✓									✓			
FL00108 Site #4-3	11			✓												
FL00108 Site# 12-1	2-22-99			✓								✓			X	
FL00108 Site# 12-2	11			✓									✓			
FL00108 Site# 12-3	11			✓										✓		
FL00108 Site# 14-1	2-22-99			✓								✓			X	
FL00108 Site # 14-2	11			✓									✓			
FL00108 Site# 14-3	11			✓										✓		

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months (A lee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other Contract

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By: Mario Fernandez	2-22-98		1. Received By		
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By	022499	

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

QUA-4124 0797

Quanterra

Quote 24566

Client	Project Manager	Date	Chain of Custody Number
U.S. Geological Survy	MARio Fernandz	2-22-99	12336
Address: 4710 Eisenhowe Blvd	Telephone Number (Area Code)/Fax Number: 813-884-7336 Ext 119	Lab Number	Page 2 of 4
City: Tampa; State: Fl; Zip Code: 33634	Site Contact; Lab Contact		
Project Name: FL00108	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil		Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis (Attach list if more space is needed): 8310	8080	8140	Trace Metals	Special Instructions/ Conditions of Receipt
FL00108 Site #18-1	2-22-99												X	X	X		Al, As, Cd, Cr, Cu, Fe, Pb, Zn, Hg
FL00108 Site #18-2	"												X	X	X		
FL00108 Site #18-3	"												X	X	X		
FL00108 Site #22-1	2-22-99												X	X			
FL00108 Site #22-2	"												X	X	X		
FL00108 Site #22-3	"												X	X	X		
FL00108 Site #26-1	2-22-99												X				
FL00108 Site #26-2	"													X			
FL00108 Site #26-3	"														X		

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other Contract

QC Requirements (Specify)

1. Relinquished By	Date	Time	1. Received By	Date	Time
Mario Fernandez	2-22-99				
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time
			[signature]	022499	0900

Comments

2

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

Quanterra

QUA-4124 0797

Quote 24566

Client: U.S. Geological Survey	Project Manager: Mario Fernandez	Date:	Chain of Custody Number: 12338
Address: 4710 Eisenhower Blvd	Telephone Number (Area Code)/Fax Number: 813-884-9336 EXT 119	Lab Number:	Page 3 of 4
City: Tampa · State: Fl · Zip Code: 33630	Site Contact:	Lab Contact:	
Project Name: FL00108	Carrier/Waybill Number:		
Contract/Purchase Order/Quote No.:			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis: 8310	8080	8140	Trace Metal	Special Instructions/Conditions of Receipt
FL00108 Site # 27-1	2-22-99											X				Al, As, Cd, Cr, Cu
FL00108 Site # 27-2	}												X			Fe, Pb, Zn, Hg
FL00108 Site # 27-3	}													X		
FL00108 Site # 30-1	}											X				
FL00108 Site # 30-2	}												X			
FL00108 Site # 30-3	}													X		
FL00108 Site # 60-1												X				
FL00108 Site # 60-2													X			
FL00108 Site # 60-3														X		

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☐ Disposal By Lab ☐ Archive For ______ Months (A lee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other Contract

QC Requirements (Specify)

1. Relinquished By: [signature]	Date: 2-22-99	Time:	1. Received By	Date	Time
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By: [signature]	Date: 022499	Time: 0900

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

QUA-4124 0797

Quanterra

Quote 24566

Client: U.S. Geological Survey	Project Manager: Mona Fernandez	Date	Chain of Custody Number: 12339
Address: 4710 Eisenhower Blvd	Telephone Number (Area Code)/Fax Number: 813-884-9336 Ext 147	Lab Number	Page 4 of 4
City: Tampa / State: FL / Zip Code: 33634	Site Contact	Lab Contact	
Project Name: FL00108	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis (Attach list if more space is needed): 8310	8080	8140	Trace Metals	Special Instructions/ Conditions of Receipt
FL 00108 Site #33-1	2-22-99											X				Al, As, Cd, Cr, Cu,
FL 00108 Site #33-2	}												X			Fe, Pb, Zn, Hg
FL 00108 Site #33-3	}													X		

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months (A lee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other Contract

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By: Mona Fernandez			1. Received By		
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By: [signature]	022499	0900

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Sample Receiving Checklist

Lot #: D9B240185 Date/Time Received: 022499 0900

Company Name & Sampling Site: USGS Florida

*Cooler #(s): 1

Temperatures: 3.6

Unpacking & Labeling Check Points:

N/A	Yes	No		Initials
	☑	☐	1. Cooler seals intact.	PK
	☑	☐	2. Chain of custody present.	
	☐	☑	3. Bottles broken and/or are leaking, comment if yes.	

PHOTOGRAPH BROKEN BOTTLES

N/A	Yes	No		Initials
	☑	☐	4. Containers labeled, comment if no.	
	☑	☐	5. pH of all samples checked and meet requirements, note exceptions.	
	☑	☐	6. Chain of custody includes "received by" and "relinquished" by signatures, dates, and times.	
	☑	☐	7. Receipt date(s) > 48 hours past the collection date(s)? If yes, notify PA/PM.	
	☑	☐	8. Chain of custody agrees with bottle count, comment if no.	
	☑	☐	9. Chain of custody agrees with labels, comment if no.	
☑	☐	☐	10. VOA samples filled completely, comment if no.	
☑	☐	☐	11. VOA bottles preserved, check for labels.	
	☐	☑	12. Did samples require preservation with sodium thiosulfate?	
☐	☐	☑	13. If yes to #12, did the samples contain residual chlorine?	
☐	☐	☑	14. Sediment present in "D," dissolved, bottles.	
	☐	☑	15. Are analyses with short holding times requested?	
☐	☐	☑	16. Is extra sample volume provided for MS, MSD or matrix duplicates?	
	☐	☑	17. Multiphase samples present? If yes, comment below.	
	☐	☑	18. Any subsampling for volatiles? If yes, list samples.	

PHOTOGRAPH MULTIPHASE SAMPLES

N/A	Yes	No		Initials
☑	☐	☐	19. Clear picture taken, labeled, and stapled to project folder.	
☑	☐	☐	20. Subcontract COC signed and sent with samples to bottle prep?	
	☐	☑	21. Was sample labeling double checked by a second person?	

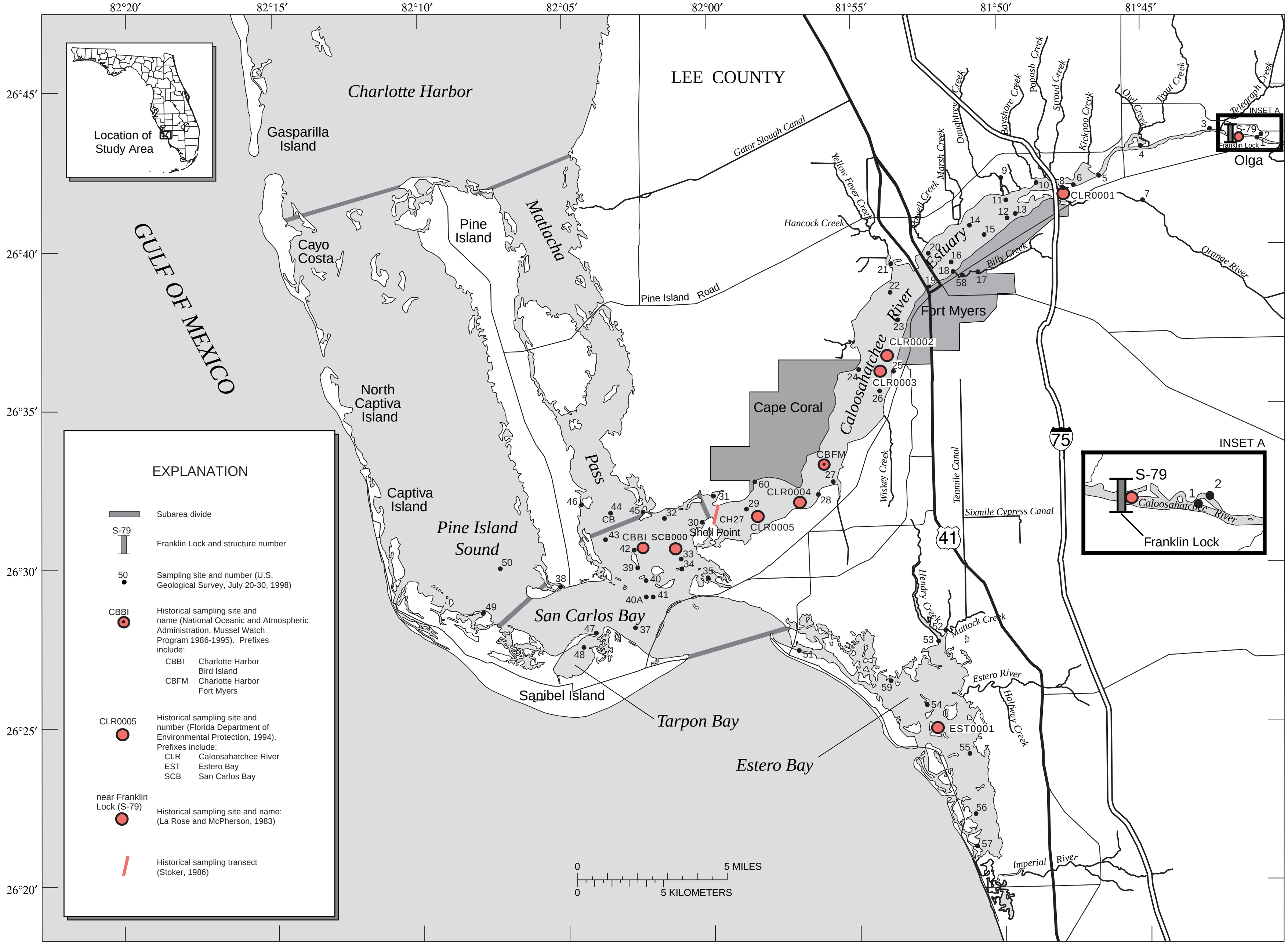
Document any problems or discrepancies and the actions taken to resolve them on a Condition Upon Receipt Anomaly Report (CUR)

\QA\Forms\Sample Receiving\SR Checklist 2/10/99 Revision

OPEN-FILE REPORT 99–226
Location of bottom sediment sampling sites — Plate 1
Fernandez, M., Jr., and others, 1999, Reconnaissance of chemical and physical characteristics of selected bottom sediments of the Caloosahatchee River and estuary, and contiguous bays, Lee County, Florida, July 20-30, 1998

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
SOUTH FLORIDA WATER MANAGEMENT DISTRICT



Base from U.S. Geological Survey digital data, 1:100,000, 1983
Albers Equal-Area Conic projection
Standard Parallels 29° 30′ and 45° 30′, central meridian –83° 00′

LOCATION OF PREVIOUS BOTTOM-SEDIMENT SAMPLING SITES (1982-1997), AND PRESENT BOTTOM-SEDIMENT SAMPLING SITES IN THE CALOOSAHATCHEE RIVER AND ESTUARY STUDY AREA, LEE COUNTY, FLORIDA, JULY 20-30, 1998

Fernandez, M., Jr., and others, 1999, Reconnaissance of chemical and physical characteristics of selected bottom sediments of the Caloosahatchee River and estuary, and contiguous bays, Lee County, Florida, July 20-30, 1998

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Prepared in cooperation with the
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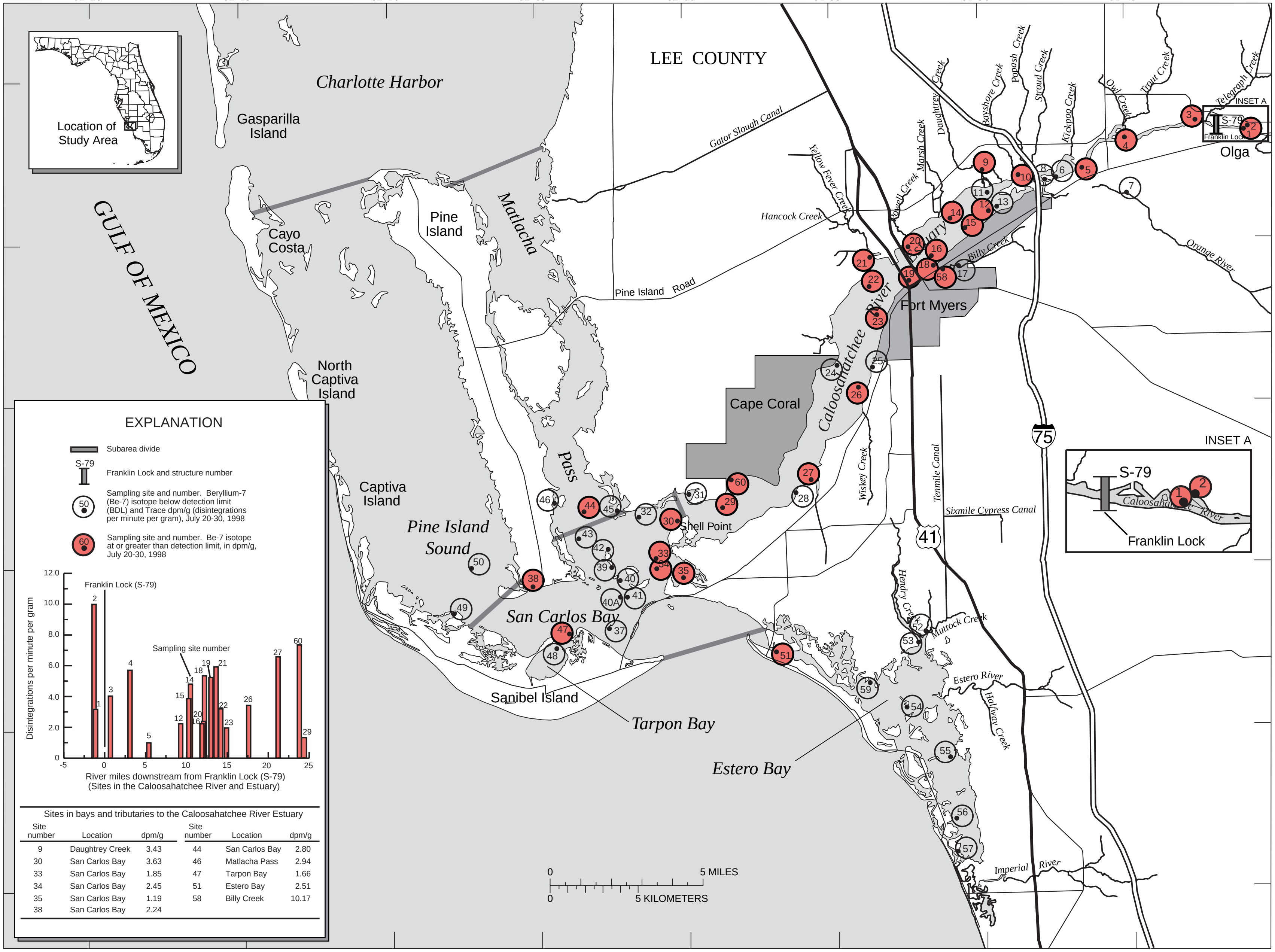

Sites in bays and tributaries to the Caloosahatchee River Estuary

Site number	Location	dpm/g	Site number	Location	dpm/g
9	Daughtrey Creek	3.43	44	San Carlos Bay	2.80
30	San Carlos Bay	3.63	46	Matlacha Pass	2.94
33	San Carlos Bay	1.85	47	Tarpon Bay	1.66
34	San Carlos Bay	2.45	51	Estero Bay	2.51
35	San Carlos Bay	1.19	58	Billy Creek	10.17
38	San Carlos Bay	2.24			

Base from U.S. Geological Survey digital data, 1:100,000, 1983
Albers Equal-Area Conic projection
Standard Parallels 29° 30′ and 45° 30′, central meridian −83° 00′

DISTRIBUTION OF BERYLLIUM-7 IN BOTTOM SEDIMENT IN THE CALOOSAHATCHEE RIVER AND ESTUARY STUDY AREA, LEE COUNTY, FLORIDA, JULY 20-30, 1998

Fernandez, M., Jr., and others, 1999, Reconnaissance of chemical and physical characteristics of selected bottom sediments of the Caloosahatchee River and estuary, and contiguous bays, Lee County, Florida, July 20-30, 1998

U.S. DEPARTMENT OF THE INTERIOR
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Prepared in cooperation with the
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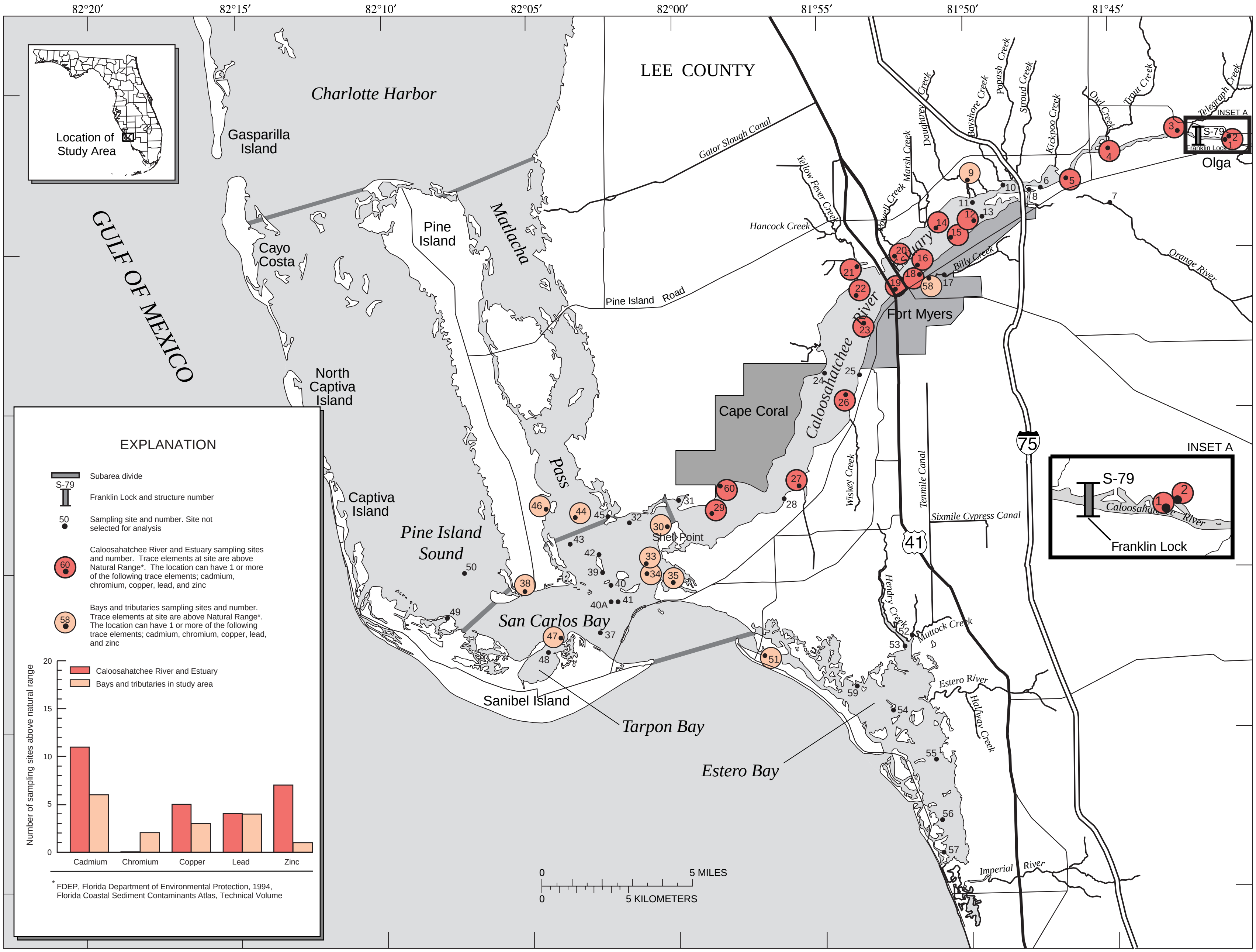

Base from U.S. Geological Survey digital data, 1:100,000, 1983
Albers Equal-Area Conic projection
Standard Parallels 29° 30′ and 45° 30′, central meridian -83° 00′

DISTRIBUTION OF TRACE ELEMENTS ABOVE NATURAL RANGE IN BOTTOM SEDIMENT IN THE CALOOSAHATCHEE RIVER AND ESTUARY STUDY AREA, LEE COUNTY, FLORIDA, JULY 20-30, 1998

OPEN-FILE REPORT 99–226
Distribution of total organic carbon in bottom sediment — Plate 4
Fernandez, M., Jr., and others, 1999, Reconnaissance of chemical and physical characteristics of selected bottom sediments of the Caloosahatchee River and estuary, and contiguous bays, Lee County, Florida, July 20-30, 1998

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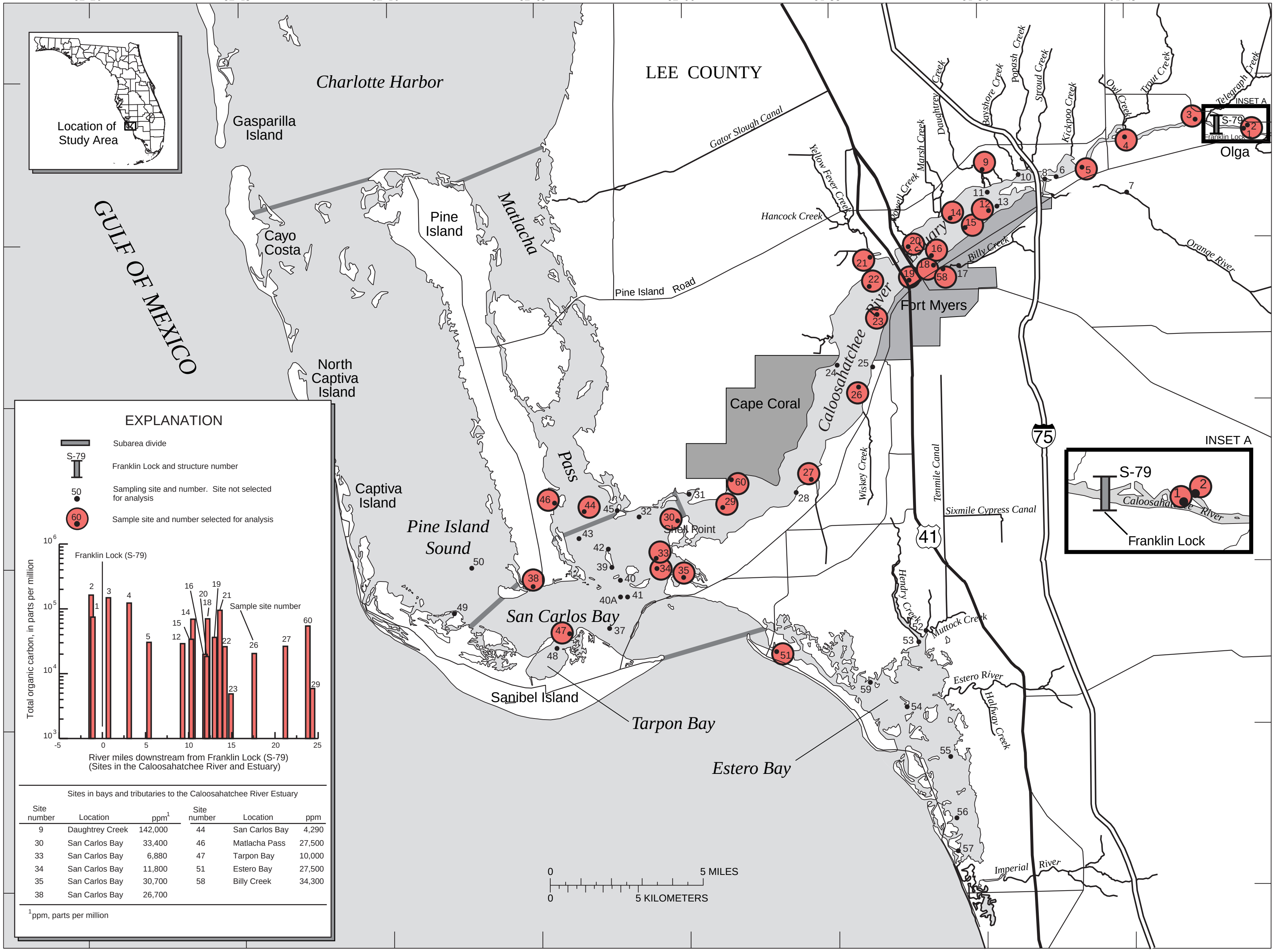

Sites in bays and tributaries to the Caloosahatchee River Estuary

Site number	Location	ppm[1]	Site number	Location	ppm
9	Daughtrey Creek	142,000	44	San Carlos Bay	4,290
30	San Carlos Bay	33,400	46	Matlacha Pass	27,500
33	San Carlos Bay	6,880	47	Tarpon Bay	10,000
34	San Carlos Bay	11,800	51	Estero Bay	27,500
35	San Carlos Bay	30,700	58	Billy Creek	34,300
38	San Carlos Bay	26,700			

[1]ppm, parts per million

Base from U.S. Geological Survey digital data, 1:100,000, 1983
Albers Equal-Area Conic projection
Standard Parallels 29° 30′ and 45° 30′, central meridian −83° 00′

DISTRIBUTION OF TOTAL ORGANIC CARBON IN BOTTOM SEDIMENT IN THE CALOOSAHATCHEE RIVER AND ESTUARY STUDY AREA, LEE COUNTY, FLORIDA, JULY 20-30, 1998

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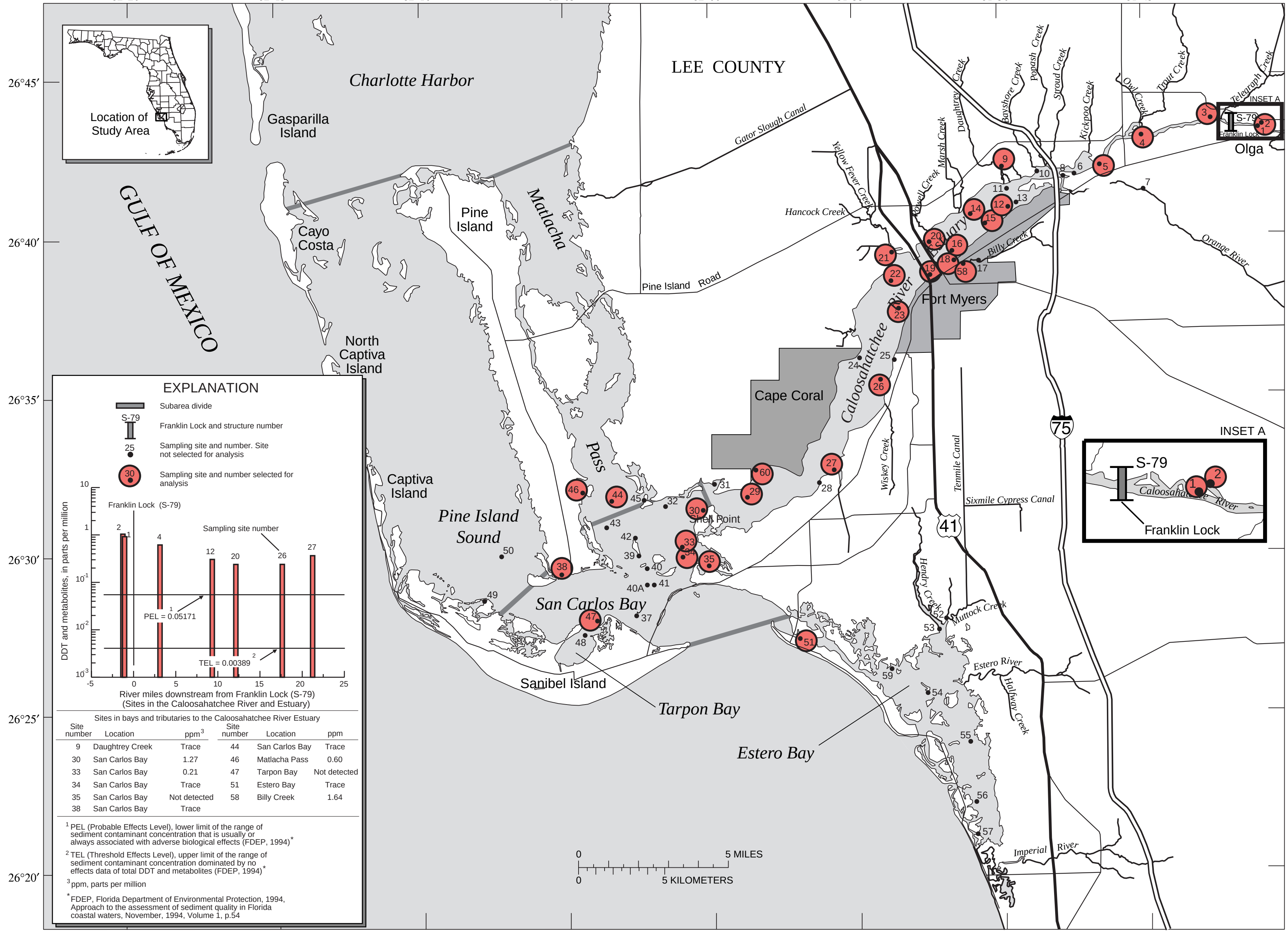
OPEN-FILE REPORT 99–226
Distribution of DDT enzyme-linked immunosorbent assay data in bottom sediment — Plate 5
Fernandez, M., Jr., and others, 1999, Reconnaissance of chemical and physical characteristics of selected bottom sediments of the Caloosahatchee River and estuary, and contiguous bays, Lee County, Florida, July 20-30, 1998



Sites in bays and tributaries to the Caloosahatchee River Estuary

Site number	Location	ppm[3]	Site number	Location	ppm
9	Daughtrey Creek	Trace	44	San Carlos Bay	Trace
30	San Carlos Bay	1.27	46	Matlacha Pass	0.60
33	San Carlos Bay	0.21	47	Tarpon Bay	Not detected
34	San Carlos Bay	Trace	51	Estero Bay	Trace
35	San Carlos Bay	Not detected	58	Billy Creek	1.64
38	San Carlos Bay	Trace			

[1] PEL (Probable Effects Level), lower limit of the range of sediment contaminant concentration that is usually or always associated with adverse biological effects (FDEP, 1994)*

[2] TEL (Threshold Effects Level), upper limit of the range of sediment contaminant concentration dominated by no effects data of total DDT and metabolites (FDEP, 1994)*

[3] ppm, parts per million

*FDEP, Florida Department of Environmental Protection, 1994, Approach to the assessment of sediment quality in Florida coastal waters, November, 1994, Volume 1, p.54

Base from U.S. Geological Survey digital data, 1:100,000, 1983
Albers Equal-Area Conic projection
Standard Parallels 29° 30′ and 45° 30′, central meridian –83° 00′

DISTRIBUTION OF DDT ENZYME-LINKED IMMUNOSORBENT ASSAY DATA IN BOTTOM SEDIMENT IN THE CALOOSAHATCHEE RIVER AND ESTUARY STUDY AREA, LEE COUNTY, FLORIDA, JULY 20-30, 1998

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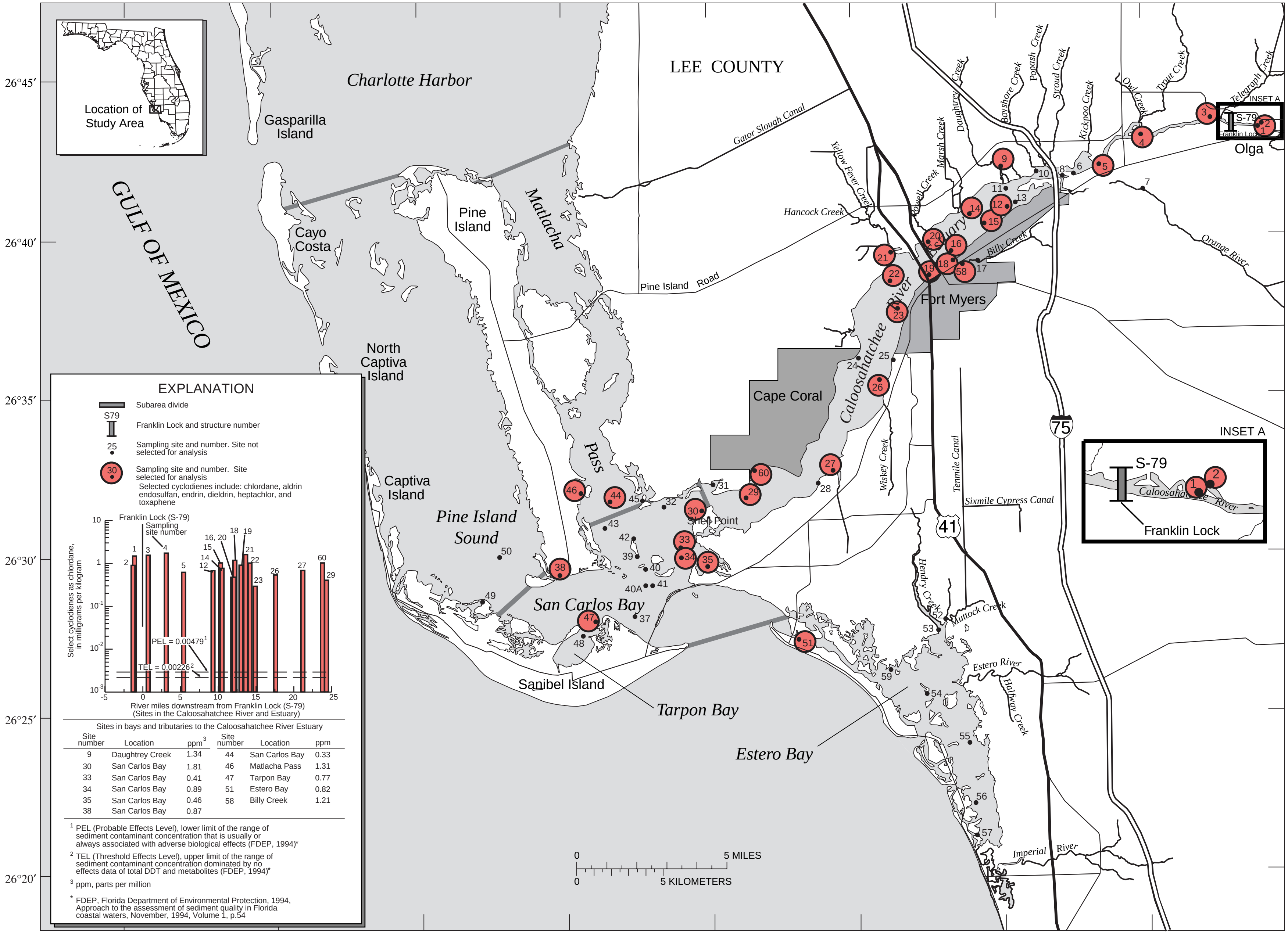
Fernandez, M., Jr., and others, 1999, Reconnaissance of chemical and physical characteristics of selected bottom sediments of the Caloosahatchee River and estuary, and contiguous bays, Lee County, Florida, July 20-30, 1998



EXPLANATION

Subarea divide

S79 Franklin Lock and structure number

25 Sampling site and number. Site not selected for analysis

30 Sampling site and number. Site selected for analysis

Selected cyclodienes include: chlordane, aldrin endosulfan, endrin, dieldrin, heptachlor, and toxaphene

Select cyclodienes as chlordane, in milligrams per kilogram
10
1
10^-1
10^-2
10^-3
Franklin Lock (S-79)
Sampling site number
1
2
3
4
5
12
14
15
16, 20
18
19
21
22
23
26
27
60
29
PEL = 0.00479 1
TEL = 0.00226 2
-5
0
5
10
15
20
25
River miles downstream from Franklin Lock (S-79)
(Sites in the Caloosahatchee River and Estuary)

Sites in bays and tributaries to the Caloosahatchee River Estuary

Site number	Location	ppm[3]	Site number	Location	ppm
9	Daughtrey Creek	1.34	44	San Carlos Bay	0.33
30	San Carlos Bay	1.81	46	Matlacha Pass	1.31
33	San Carlos Bay	0.41	47	Tarpon Bay	0.77
34	San Carlos Bay	0.89	51	Estero Bay	0.82
35	San Carlos Bay	0.46	58	Billy Creek	1.21
38	San Carlos Bay	0.87			

[1] PEL (Probable Effects Level), lower limit of the range of sediment contaminant concentration that is usually or always associated with adverse biological effects (FDEP, 1994)*

[2] TEL (Threshold Effects Level), upper limit of the range of sediment contaminant concentration dominated by no effects data of total DDT and metabolites (FDEP, 1994)*

[3] ppm, parts per million

* FDEP, Florida Department of Environmental Protection, 1994, Approach to the assessment of sediment quality in Florida coastal waters, November, 1994, Volume 1, p.54

Base from U.S. Geological Survey digital data, 1:100,000, 1983
Albers Equal-Area Conic projection
Standard Parallels 29° 30′ and 45° 30′, central meridian –83° 00′

DISTRIBUTION OF CHLORDANE ENZYME-LINKED IMMUNOSORBENT ASSAY DATA IN BOTTOM SEDIMENT IN THE CALOOSAHATCHEE RIVER AND ESTUARY STUDY AREA, LEE COUNTY, FLORIDA, JULY 20-30, 1998

Distribution of carcinogenic polycyclic aromatic hydrocarbons
enzyme-linked immunosorbent assay data in bottom sediment — Plate 7
Fernandez, M., Jr., and others, 1999, Reconnaissance of chemical and physical characteristics of selected bottom sediments of the Caloosahatchee River and estuary, and contiguous bays, Lee County, Florida, July 20-30, 1998

U.S. DEPARTMENT OF THE INTERIOR
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Prepared in cooperation with the
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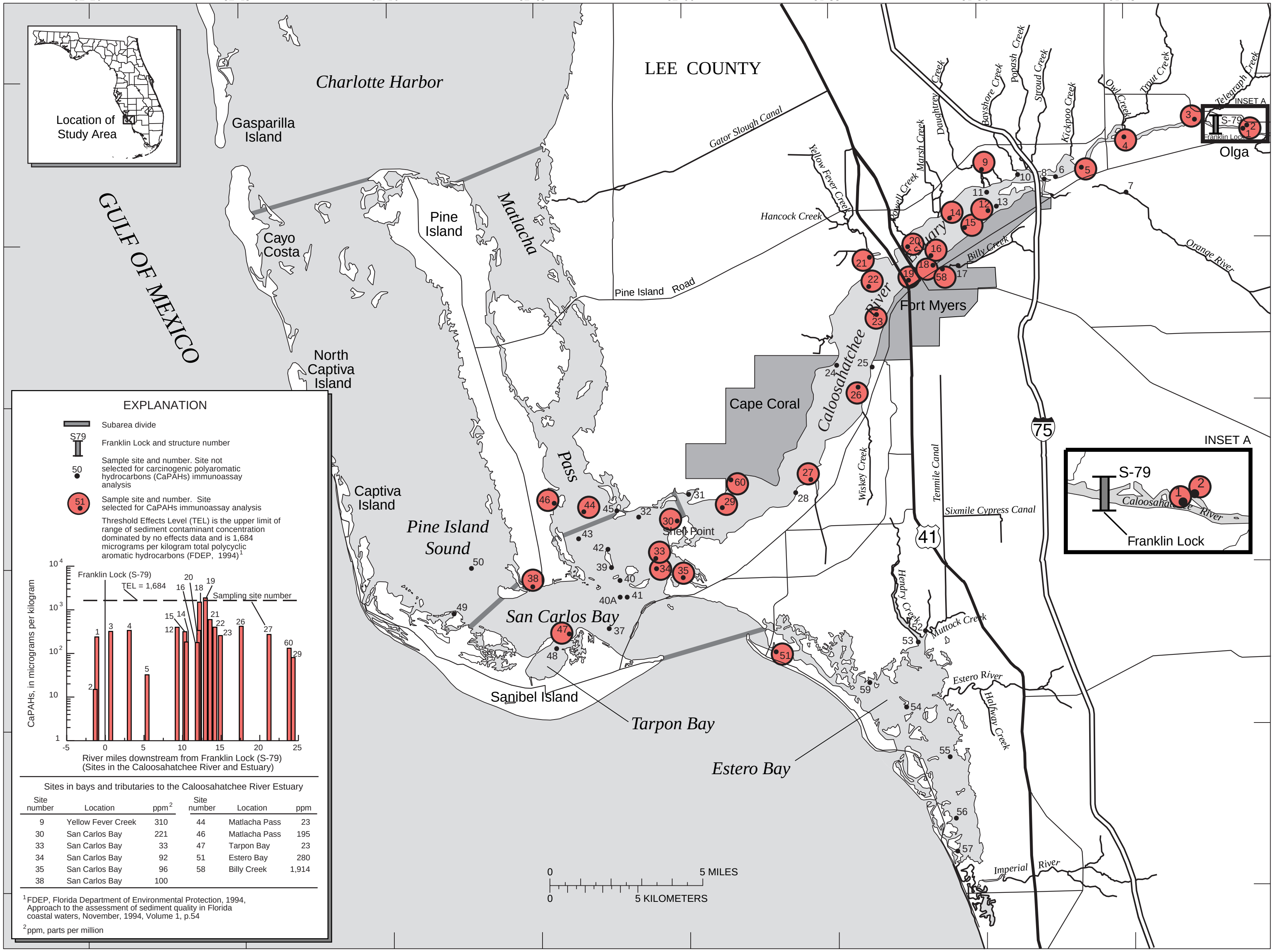

Sites in bays and tributaries to the Caloosahatchee River Estuary

Site number	Location	ppm[2]	Site number	Location	ppm
9	Yellow Fever Creek	310	44	Matlacha Pass	23
30	San Carlos Bay	221	46	Matlacha Pass	195
33	San Carlos Bay	33	47	Tarpon Bay	23
34	San Carlos Bay	92	51	Estero Bay	280
35	San Carlos Bay	96	58	Billy Creek	1,914
38	San Carlos Bay	100			

[1] FDEP, Florida Department of Environmental Protection, 1994, Approach to the assessment of sediment quality in Florida coastal waters, November, 1994, Volume 1, p.54

[2] ppm, parts per million

Base from U.S. Geological Survey digital data, 1:100,000, 1983
Albers Equal-Area Conic projection
Standard Parallels 29° 30′ and 45° 30′, central meridian –83° 00′

DISTRIBUTION OF CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS ENZYME-LINKED IMMUNOSORBENT ASSAY DATA IN BOTTOM SEDIMENT IN THE CALOOSAHATCHEE RIVER AND ESTUARY STUDY AREA, LEE COUNTY, FLORIDA, JULY 20-30, 1998